COMPTON'S PICTURED ENCYCLOPEDIA



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Hilda Hanway

Imagination

DO WE not all understand, when we are reading a great story or a beautiful poem, that we have jumped up behind a genius, as it were, and that he is taking us for a ride on his winged horse, Imagination? And do we not also understand that if we ourselves had not a great imagination in our souls we could never enjoy that magic ride?

"Somebody has said that a child takes up a twig and calls it a king, and it is true that the imagination of a child is a supreme and wonderful thing. A child knows better than all the grown-ups in the world that this beautiful and romantic earth is not the real thing, that there is in fact a much more beautiful and much more romantic world all about us if we have eyes to see it and imagination to enter into it."

(See page 1737)

IMAGINATION



COMPTON'S PICTURED ENCYCLOPEDIA

VOLUME 4

To inspire ambition, to stimulate the imagination, to provide the inquiring mind with accurate information told in an interesting style, and thus lead into broader fields of knowledge—such is the purpose of this work



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HERE AND THERE in Volume Four

AT ODD TIMES when you are just looking for "something interesting to read," without any special plan in mind, this list will help you. Divided as it is into broad groups, it offers a fascinating variety of subjects for selection. With this as a guide, you may wander through storyland, visit far-away countries, meet famous people of ancient and modern times, review history's most brilliant incidents, explore the marvels of nature and science, play games—in short, find whatever suits your fancy of the moment. This list contains, however, only a small proportion of the articles in this one volume, and is not intended to serve as a table of contents, an index, or a study-guide. For these purposes consult the Fact-Index and the Study Outlines in Volume Eight.

TALES FOR THE STORY HOUR

The Death of Hector 1626
Some Adventures of the Great Hercules 1640
The Luck of the Calico Horse 1686
The Story of Jean Valjean 1695
A New American—The Story of Mary Antin 1739
Little Eagle-Heart and His Sister, Laughing-Water 1775
The Fairy Calf of Tipperary 1812
The Story of Mowgli 1927
The Story of Androcles and the Lion 2025
The Story of Hiawatha 2059
The Woodman's Tale of the Lynx with Wings 2088

LITTLE TALKS ON GREAT THINGS: BY ARTHUR MEE

Honesty 1677
Humility 1697
Imagination 1737
Keeping Our Word 1915

PARENT AND CHILD; SCHOOL AND HOME

Your Health and How to Keep It 1713
Tricks that Test Your Intelligence 1792
Froebel's System of Child Education 1923
Maps and How to Read Them 2142

HIGH LIGHTS IN HISTORY'S PAGEANT

History's Pageant through the Ages 1653
The Days of Crécy, Poitiers, and Agincourt 1699
Our Red-Skinned Cousins—The First Americans 1765
"Salvator Mundi"—The Story of Jesus 1887
The Children of Israel—The "Eternal People" 1889
"In Days of Old, When Knights Were Bold" 1933
The Battle of Lexington and Concord 1990
Louis—A Royal Name in France for 13 Centuries 2064

THE STORY OF THE PRESIDENTS

President Hayes, Valiant Fighter in War and Peace 1610
The Frontiersman who Became President 1855
The Father of American Democracy 1880
The Stormy Career of Andrew Johnson 1896

Here and There in Volume 4

"New Birth of Our New Soil, the First American" . . . 2011
McKinley—War President and Martyr . . . 2103
Madison—"Father of the Constitution" . . . 2106

SOME FAMOUS MEN AND WOMEN

How "Stonewall" Jackson Got His Name . . . 1858
Saint Joan of Arc, the Maid who Saved France . . . 1893
"Papa" Joffre, the Hero of the Marne . . . 1894
John Paul Jones—Born Fighter . . . 1900
Kitchener of Khartum, who Lived and Died a Soldier . . . 1929
A Hero of Three Revolutions . . . 1956
The Military Genius and Hero of the Southern Confederacy . . . 1982
The Men who First Crossed the United States . . . 1989
The Great Missionary Explorer of Africa . . . 2033
The "Little Welshman," Britain's Great War Minister . . . 2039
How Cyrus McCormick Rode to Fame on a Reaper . . . 2095
The First Premier of the Canadian Dominion . . . 2096

TOURS THROUGH NORTH AND SOUTH AMERICA

Where Railroad Trains Go Out to Sea . . . 1921
In the Lonely Land of Labrador . . . 1948
In Peru's Magnificent Capital . . . 2009
Sunny Los Angeles and Its Wonderful Growth . . . 2062
Where Canada Grows the World's Finest Wheat . . . 2136

THE STORY OF THE STATES

The Land of the Coeur D'Alene and Shoshone . . . 1725
In the Heart of the Union—The "Prairie State" . . . 1730
Factories, Mines, and Fields of the "Hoosier State" . . . 1757
The Prosperous "Hawkeye State"—First in Corn . . . 1803
The "Sunflower" State's Fertile Prairies . . . 1909
In Old Kentucky—The "Bluegrass State" . . . 1916
"Child of the Mississippi," Sunny Louisiana . . . 2068
"Down East" in the Pine Tree State . . . 2125

TRAVEL-VIEWS OF LANDS ACROSS THE SEAS

A Paradise of the Pacific . . . 1601
The Broad Hungarian Plain and Its Picturesque People . . . 1702
The Teeming Millions of Britain's Indian Empire . . . 1743
Past and Present of the Emerald Isle . . . 1807
"Beyond the Alps Lies Italy" . . . 1835
The Land of the Rising Sun . . . 1862
The Children of Topsy-Turvy Land . . . 1870
The Sacred City of Two Faiths . . . 1885
The "Land of Morning Calm" . . . 1942
Giant London—The Heart of the British Empire . . . 2048

SPORTS AND GAMES AND OTHER WORTH-WHILE THINGS TO DO

Hockey on Land and on Ice . . . 1669
Kites and How They are Used . . . 1930
Knots and How to Tie Them . . . 1937
The Old Indian Game of Lacrosse . . . 1954

IN THE PLANT AND ANIMAL WORLD

Fierce Bandits of Bird Land . . . 1605
The Huge "Water Pig" of Africa . . . 1651
Our Sagacious Comrade and Helper, the Horse . . . 1683
The Six-Legged Creatures of Air, Land, and Water . . . 1781
Jelly-Fish and Their Strange Life History . . . 1883
The Kangaroo and His Three-Legged Stool . . . 1907
All About Leaves and Their Uses to Plants . . . 1980

Here and There in Volume 4

King Lion, the Monarch of the Cat Family . . . 2024
The Scaly Dragons of Modern Times . . . 2035
The Tree that Gives Us Maple Syrup . . . 2138

THE WONDER WE CALL "LIFE"

The Living Pump that Keeps Our Blood Pulsing . . . 1615
Life's Laws of Inheritance, from Plants to Man . . . 1641
Sleep that Lasts All Winter Long . . . 1646
The Bellows with which We Draw Our Breath . . . 2083

MARVELS OF SCIENCE AND INVENTION

The Marvels of Heat, and How Men Have Mastered It . . . 1617
Machinery that Puts Water to Work . . . 1708
Inventions that Have Changed the World . . . 1795
Clever Machines that Know How to Knit . . . 1935
The Magic of the Lens . . . 1986
What Scientists Know of the Marvels of Light . . . 1997
The Marvelous Linotype and what It Does . . . 2019
The Inside Workings of a Lock . . . 2042
How Our "Iron Horse" Got on the Track . . . 2043
The Device that Measures the Speed of Ships . . . 2045
Guns that Fire 600 Shots a Minute . . . 2097
The Magnet and Its Mysterious Power . . . 2121

THE WORLD AT WORK

The Story of Hats and How They are Made . . . 1597
Artificial Climates for Our Buildings . . . 1621
How "Rope" is Grown and Harvested . . . 1630
How Insurance Divides the Burdens of Misfortune . . . 1791
The Miracles of Iron and Steel . . . 1815
Making Desert and Swamp Blossom as the Rose . . . 1827
Story of the Twelve Men in the Jury Box . . . 1903
Dainty Laces and How They are Made . . . 1949
How Hides and Skins Become Leather . . . 1975
From Logging Camp to Sawmill . . . 2076

GUIDE-POSTS TO LITERATURE, ART, AND MUSIC

The Author of 'The Scarlet Letter' . . . 1607
Beloved Haydn, and His Struggle to Fame . . . 1609
The Hebrew Language and Literature . . . 1624
Heinrich Heine and His Eccentric Genius . . . 1628
Versatile Hans Holbein, Germ ny's Greatest Painter . . . 1672
The Blind Father of All the Poets . . . 1675
The Titanic Master of French Romance . . . 1694
Ibsen and How He Revolutionized the Drama . . . 1720
The Sonorous Italian Tongue, Beloved of Poets . . . 1832
Where Beauty Rules the Humblest Home . . . 1873
Samuel Johnson, the Literary Dictator of His Day . . . 1898
John Keats, Poet of Beauty . . . 1914
Landseer, Friend and Painter of Animals . . . 1960
The Mother-Tongue of the Civilized World . . . 1965
The Shining Doors to Wonderland—Literature for Children . . . 2027

RAMBLES THROUGH FACTLAND

Workers who Fight Our Battles against Disease . . . 1612
The Strange Power of Hypnosis . . . 1717
The Story of a Drop of Ink . . . 1779
The Open Treasure Houses of the World's Wisdom . . . 1991
Life Savers and Their Work . . . 1995
Lights that Warn and Guide the Ships . . . 2003

KEY TO PRONUNCIATION

Pronunciations have been indicated in the body of this work only for words which present special difficulties. For the pronunciation of other words, consult the Fact-Index in the last volume. Marked letters are sounded as in the following words: *cāpe, ăt, fär, fȧst, swạt, fạll; mē, yĕt, fēr̈n, thêre; īce, bĭt; rōw, nŏt, fôr, wȯn, dọ; cūre, bŭt, düne* (French *u*), *rụ̈de, fụll, bûrn; ḡo, ġem, cañyon, Jeaṅ*, (nasal); ɢ = German *g* (guttural); ĸ = German *ch* (guttural).

COMPTON'S PICTURED ENCYCLOPEDIA
VOL. 4

The Story of HATS *and* HOW THEY ARE MADE

What Endless Variety in the Headgear of Different Peoples!—The History and Geography of Hats—A Visit to a Felt Hat Factory—Why Panamas Cost So Much—Why Men Lift Their Hats to Women

HATS AND CAPS. If we could assemble specimens of the headgear of every land and age on one gigantic hat rack, what an amusing and interesting sight it would make! The fur hood of the Eskimo would stand beside the Mexican's high peaked hat; and between the glossy silk hat of civilization and the huge umbrella-like straw hat of the Burmese would glow the turban of the Mohammedan and the bright bonnet of the Scotch Highlander. The cone-shaped hats of the early Aegean civilization—4,000 years ago—and the tall cylindrical headgear of the Hittite kings and queens would present a fascinating contrast to the cocked hat of Washington's time and the cowboy hat of the western plains. The stiffly wired cap of the Norwegian bride would be there, and the huge flapping fur hat, lined with red velvet and adorned with a great feather, that Charles XII of Sweden wore when entering Rouen in 1453.

Why such a marvelous variety of forms? Partly to serve particular needs, partly just for ornament. In regions of great heat or intense cold, protection is the first purpose of head covering; but in the civilized countries of the temperate zone, where it is rarely excessively hot, cold, or wet, hats vary greatly in shape, size, and material. Bright colors are common; hats are designed, to a great extent, for decoration; and fashion determines the materials. These materials are gathered from all over the world—straw from the Philippines, Italy, and Japan; rabbit fur for felt from Australia and central Europe; silk from China, Italy, and Japan; fancy furs and feathers from a score of lands. Countries where there is little foreign commerce must use materials close at hand, and headdress once adopted is used for centuries.

How Felt Hats are Made

If ever you get the chance, visit one of our great felt-hat factories, and see how your derby or soft hat has grown out of a few scraps of fur from an animal that once scampered over the plains of Australia, Argentina, or Canada. For the finer grades, fur alone is used; but cheaper hats are made from a mixture of wool and fur, or wool alone. The first step is to clean and brush the fur while it is still on the skin and "carrot" it by brushing on nitrate of mercury to make it felt more easily. Then a machine shears off the fur, which passes on an endless belt to blowing machines. In these the soft fluff is torn apart by steel teeth and freed from hairs or foreign material.

Now begins the transformation into a hat. The exact amount of fur needed to make one hat is passed to a boxed-in machine, which contains a minutely perforated copper cone about three feet high. As this cone revolves, myriads of the mistlike fur particles are drawn by suction to its damp outer side, forming a thin covering of felt. A wet cloth is thrown over this matted fur, another cone is pressed over it, and the whole is immersed in a tank of hot water until it felts under the pressure. The delicate cone of felted cloth is then shrunk to the proper size, dyed, and given a bath of shellac to stiffen it—weak shellac for soft hats, and a denser solution for stiff hats. The cone is now plunged in boiling water and flattened at the crown, so that it begins to take on the appearance of a hat. It is stretched, blocked, and pulled with the aid of hot water, steam, and ingenious machinery, until it has taken the desired form. Stiff hats are put in a hydraulic press to increase their rigidity, and the brim is curled by being pressed on a flange by a bag of hot sand. The rough surface is smoothed by rubbing with emery paper, the trimming is put on, and last of all the leather sweat-band attached—and the hat is ready for the wearer.

Straw Hats, Silk Hats, and Women's Hats

Straw hats are made from carefully prepared imported straw. The braids, except in some of the finer grades, are sewed and pressed into shape by machinery, after being sized with waterproof gum. Panama hats are made from a very fine light "straw" (*toquilla*) obtained from the leaves of a shrub that grows chiefly in Ecuador, though it is also found in Colombia and the forests of the upper Amazon. The best hats take five or six months to complete, since the fibers must be kept thoroughly moistened and the weaving is done only in the late twilight or early dawn.

In the manufacture of silk hats several layers of cotton material are cemented together with shellac. This "body" is pressed into shape on a block, and the rim is cemented to it. Then it is coated with shellac, covered with silk plush, trimmed, and finished.

The manufacture of hats and caps is an important industry in the United States, centering in New York and Philadelphia, although there are large hat factories in Orange and Newark (N.J.); Danbury, Bethel, and Norwalk (Conn.); Brooklyn (N.Y.), Reading (Pa.), and in many other industrial centers.

The manufacture of women's hats is not so centralized, although the largest factories are in New York City, and many of the felt hats are made at the same factory where men's hats are manufactured. Artificial flowers, feathers, and ribbons for trimming are imported in great quantities. Most women's hats are made by covering frames of wire or buckram with various fabrics.

Some Curious Facts about Hats

Did you ever notice the tiny bow that decorates the lining or inner band of most hats, both men's and women's? Not so very long ago, hats were made in only a few sizes, and a drawstring was inserted in the lining, which was tightened or loosened to fit the head. The little bow is a relic of that old practice, although it also serves the purpose of marking the back of the hat. Nearly all these bows are made in Geneva, Switzerland.

The ancient Greeks, when traveling, protected their heads with a flat, broad-brimmed hat of felt which tied under the chin and hung down the back when not needed, like a sunbonnet of today. These tie strings are still preserved in the streamers around the crown of a child's sailor hat.

STORY OF THE LITTLE BOW



The little bows inside men's hat bands are relics of the drawstring used in olden days to make hats fit.

During the 14th and 15th centuries, women's hats, caps, and hoods were of the most extravagant shapes and sizes. Some were horned, others were great peaks, like the "dunce-cap," from a foot to three feet in height. Sometimes a veil would be draped over these towering structures, falling the length of the dress.

Hats have often had an important place in distinguishing sects and parties. The Puritan wore his severe high-crowned hat over his cropped head as a rebuke to the cavalier of the time, with his hair in curls, and a great sweeping plume on his low-crowned hat. The Quaker affected a broad-brimmed gray hat (still to be seen in some conservative communities) which he refused to doff to any man—only to his Maker. In the Roman Catholic and Anglican churches hats and other forms of headgear have a conspicuous place in the differences of costumes which distinguish various ranks and orders of the clergy. During the greater part of the 18th century, two rival political parties in Sweden, known as "Hats" and "Caps," were in constant struggle, the "Hats" representing the nobles, and the "Caps" being the party of the common people. These names were slogans in some bitter battles.

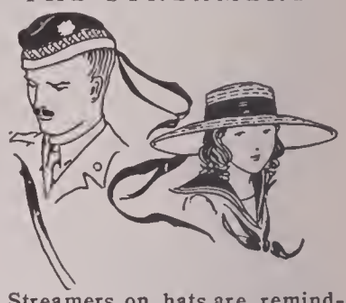
THE ANCIENT HAT BAND



The old Egyptians wore a band to keep their hair in place. We have kept the band but put it on the outside of our hats.

In the English House of Commons members may wear their hats while seated, but take them off when they rise to speak. But in one special case—after a debate has been closed and a vote ordered, but before it is actually taken—a member who wishes to raise a point of order must speak seated and with his hat on. The great Gladstone once ran foul of this custom. He had wandered away from his seat bareheaded, and wished to speak on a point of order as a vote was about to be taken. "Hat! hat! hat!" cried the members in riotous glee as he started to speak. A nearby member lent him a hat, but it was several sizes too small for Gladstone's massive head. With this perched ridiculously atop his head, the "Grand Old Man" was allowed to proceed. This incident illustrates only one of many points of etiquette regarding the hat in the House of Commons. The session is dismissed when the Speaker (the presiding officer) rises and puts on his hat.

THE STREAMERS



Streamers on hats are reminders of the tie strings on the ancient Greek traveling hats.

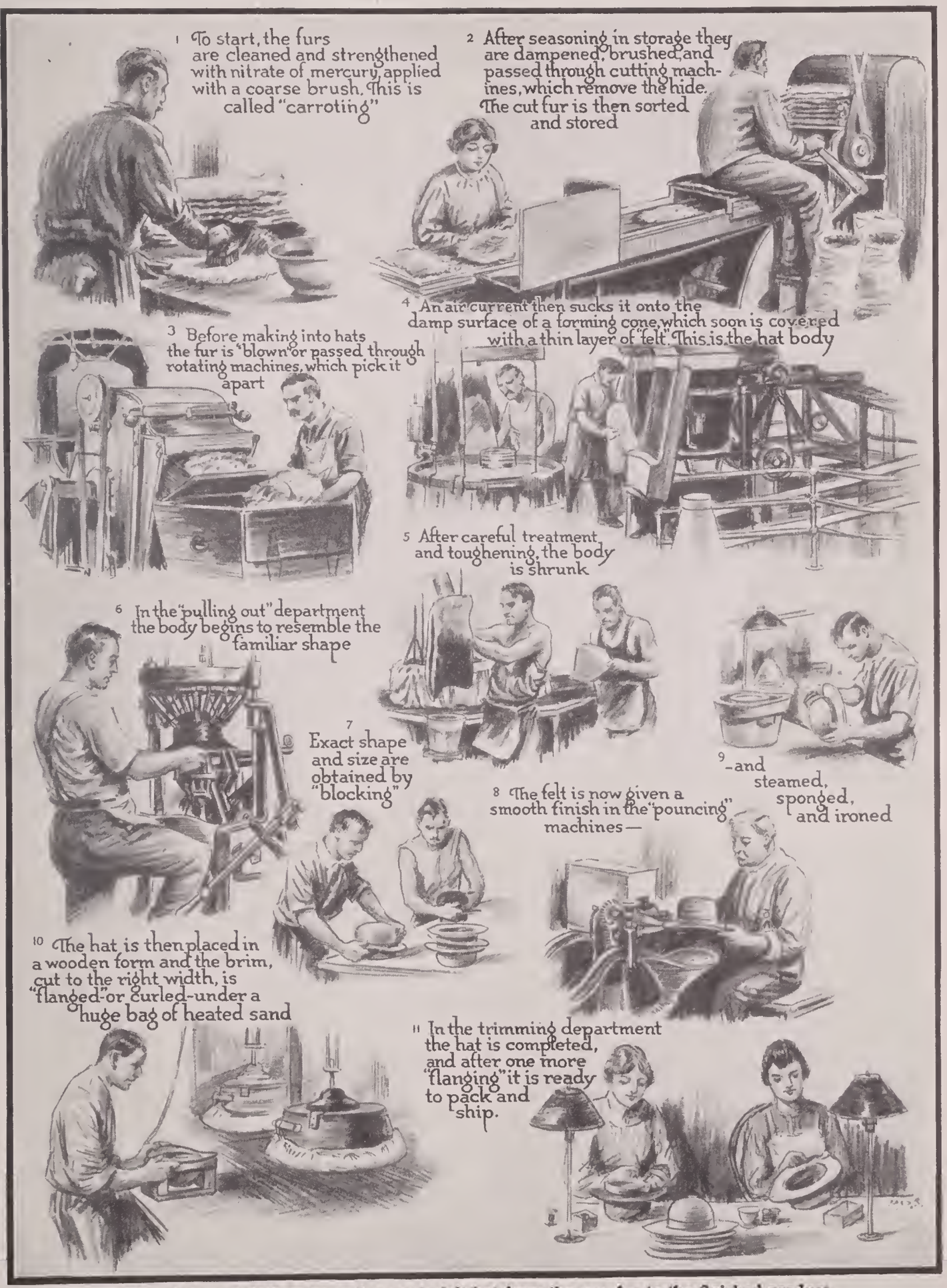
Formerly inferiors were required to uncover in the presence of superiors as a mark of respect. Today this custom survives chiefly in the custom of removing the hat in the presence of royalty and other distinguished persons, and of raising it to ladies while out of doors.

Havana, Cuba. A blinding tropical sun beats down upon the narrow white pavements, palm-fringed baseball park, glaring marble palaces, modern office buildings, old gray churches, and gay-colored Spanish houses of Cuba's capital. It blazes upon the concrete docks and forests of masts along its teeming water front, and brightens its background amphitheater of palm-fringed hills.

This is Havana—a city that has truly been called "Spain with a modern American virility, tinged with a generous dash of the tropics." It is, on the one hand, a quaint city of plazas, bazaars, cafés, and lottery, cigar, and wine shops; a city where the boom of ancient cathedral bells mingles with the clang of cart bells and the cries of street vendors as they press their way in and out of old market places piled high with tropical fruit, vegetables, and many-colored fish, and wander down cobbled lanes here and there topped with canvas canopies and edged everywhere by one-story plaster-faced houses with balconies, flat roofs, jutting iron-barred windows, and arched doors leading to dim *patios* or courts.

On the other hand, Havana is curiously modern, with a distinct American flavor. Baseball is now a well-accepted substitute for bull fights and a pretext

ELEVEN STEPS IN THE MAKING OF MEN'S HATS



The pictures tell the story of a man's felt hat from the raw fur to the finished product

contained in the Easy Reference Fact-Index at the end of this work

for as much betting; "jitney" automobiles, which are for hire everywhere, compete with clanging street-cars in mad rushes up and down the narrow old streets. The uniform of the khakied Cuban soldier is American and so too are the bill-boards, the electric signs, and the mail boxes. At all points there is thus a curious dovetailing of the old and the new. Office buildings, theaters, hotels, and clubs shoulder crumbled Spanish churches; the latest factory products are found in quaint old-time markets; modern ferries chug across the harbor beside queer old row-boats with awnings at the rear; old convents have been transformed into post-offices and homes of warehouse brokers and customs officers.

Havana is the largest and most important commercial city in the West Indies, a city of busy factories, banks, and stores of all description. Its railways shoot out to every important island center. At its doors is one of the safest harbors of the world, where 4,000 ships enter every year flying flags of many nations and laden with cargoes from the United States, Spain, and South America. These same ocean-going vessels then fill their holds with cigars, tobacco, and sugar, three-fourths of which goes to the United States. Havana possesses some of the largest cigar and tobacco factories in the world, although she makes other things, too, such as boxes, barrels, wagons, and carriages.

And last of all there is the Havana that the tourists so admire, the city famous for its promenades edged by mansions of the planter aristocracy, for its public gardens, university, and its drives—such as the beautiful Prado, with its double row of laurels and other shade trees and graceful palms running along a parkway in its middle; a city noted for its old cathedral dating back to 1724, where until 1898 the body of Columbus was said to have remained; for the picturesque old forts of Morro Castle, La Cabana, and Punto Castle, that guard the entrance to its harbor; for the Governor's fine palace; and for the many seaside resorts near by.

LOOKING DOWN THE PRADO IN HAVANA



The most attractive street in Havana is the Prado, down which we are now looking. Beginning at Punto Castle, it runs along the line of the former city walls to the Parque de Colon. It is, as you see, a very wide and handsome promenade and it is lined with fine buildings and club houses, most of them built from the limestone which underlies almost all the island. As in most cities in warm climates, the houses are low, rarely rising above three stories. Notice how the upper stories project over the sidewalk, providing a grateful shade for pedestrians.

In the older parts, Havana is still rather neglected looking, although it is much cleaner and more sanitary than it was before the United States military occupation in 1898, when the Americans helped to clean it up and eradicate its yellow fever. The newer portions of the city are modern, picturesque, and well laid out.

Havana is situated on the north coast of Cuba on a sort of peninsula between the Gulf of Mexico and the land-locked harbor. It was founded by Velasquez in 1519. It remained the chief city of the Spanish power in the West Indies till near the end of the 19th century. In February 1898 the United States battleship *Maine* was blown up in its harbor, and during the Spanish-American War that followed, the city was blockaded by the United States fleet. With the emancipation of Cuba from Spanish rule, Havana became the capital of the new republic. Population, about 365,000.

For any subject not found in its alphabetical place see information

HAVRE (*äv'r'*), FRANCE. Cities, like people, have personalities. Some are interesting and full of romance and color; some are just good work-a-day necessary places, but not very interesting. Havre, to which the French add an article, making it Le Havre ("the Harbor"), is such a work-a-day city.

But it is an important city, for its location at the mouth of the Seine River makes it the second seaport of France. Many big steamers come and go from here, and most of the French people in America have come through Le Havre. The town has nine immense harbor basins with eight miles of quays lined with warehouses. It is a very prosperous place, largely because of its ship-building yards, its sugar refineries, and its cotton trade.

Havre is quite a new town as French towns go, though it would be very old for America. It gained its first importance under Francis I, in 1516, who fortified it to use as a naval base in his wars against England. He could not foresee that in the World War of 1914–18 many thousands of British troops would pass through it to help France, and that France would be only too happy to have them come. Population, about 140,000.



We are looking here across a Hawaiian rice field. It occupies a low-lying terrace near the coast which has been flooded by the rice growers. In the distance are some of the rough volcanic hills which cover the interior of the islands. The land is remarkable for its varied scenery and luxuriant vegetation.

HAWAIIAN (*hä-wī'yăn*) **ISLANDS.** In mid-Pacific, 2,000 miles away from any important land mass, lies this lovely group of islands flying the United States flag. They lie nearly all in single file, extending from northwest to southeast—eight inhabited, and a dozen tiny rocky ones unpeopled; but together they comprise an area less than that of New Jersey, with a population about equal to that of Jersey City. The strategic value of the islands to the United States is very great. Lying within a six-days' steaming distance of San Francisco, this "cross-roads of the Pacific" affords a point from which the whole North Pacific Ocean can be patrolled by cruisers, and the commerce of the Panama Canal be protected.

Extent.—Length of island chain, about 400 miles. Total area, 6,449 square miles (island of Hawaii, 4,015 square miles). Distance from San Francisco, 2,100 miles; from Yokohama, 3,400 miles. Population (1920 census), 255,912.

Natural Features.—Islands of volcanic rock rising to mountain peaks from 15,000 feet below the sea and fringed with coral reefs. Highest peak, Mauna Kea, 13,823 feet; Kilauea, the second greatest active volcano in the world. Climate semi-tropical, the latitude being about that of Cuba.

Chief Products.—Cane sugar, canned and fresh pineapple, rice, coffee, sisal hemp, hides, and honey.

Cities and Harbors.—Honolulu (capital), population, about 84,000. Other important harbors are Pearl Harbor and Hilo Bay.

The Hawaiian Islands are really the tops of 15 or more enormous volcanoes which have been built up from the bottom of the ocean. Hawaii, the largest and most southerly island, consists of five volcanic mountains which have encroached upon one another by their eruptions. Several islands, like Maui, consist of "volcanic twins" united at the base, while others are built around a single cone. There are now no active volcanoes except on Hawaii; but all the islands are mountainous, in many places rising from the sea in sheer cliffs hundreds and even thousands of feet in height. The valleys are remarkable for their beautiful scenery, the swift short rivers having cut many deep ravines and picturesque gorges, some of which almost rival Yosemite.

Nowhere will you find a more healthful and delightful climate than in this Paradise of the Pacific. Cooled in summer and warmed in winter by the

KILAUEA AND ITS LAKE OF FIRE



A vast kettle of molten rock—that's what the crater of Kilauea is! You see the walls are brilliant with the reflection from this fiery cauldron. The oval crater is nine miles around. The lava rises and falls great distances. When this picture was taken it was only 400 feet from the surface and overflowed three weeks later.

ocean winds, it is seldom too hot and never cold, and the temperature is about ten degrees lower than in other lands of the same latitude. Owing to the northeast trade winds, the islands are well watered on their northern side, the rainfall amounting in some places to 250 inches a year. The southern slopes, however, are almost arid, especially in Hawaii, and crops are grown under irrigation. The decomposed lava rock makes a rich deep red earth most favorable to agriculture, and the more important islands contain considerable areas of this fertile soil.

As your ship steams into the beautiful harbor of Honolulu, the capital, on the south coast of Oahu, you look out over a crescent-shaped beach fringed with coconut trees, and the white and pink roofs of a town almost hidden in luxuriant foliage. Behind it are yellow-green cane fields, and in the distance the misty bluish-purple of the mountains. The harbor is crowded at all times with Japanese and Hawaiian fishing boats, ocean liners, and the tramp freighters that bring manufactured goods to the islands and return to the States with sugar, coffee, and fruit worth more than $50,000,000 in a single year. Near the dock the water is alive with brown-skinned boys swimming about and shouting, ready to dive for coins which the passengers throw into the water. If it were not for its tropical setting and its unusual population, Honolulu about the harbor would look very much like any small American city; for its government buildings, cable and wireless stations, street-cars, electric lights, and telephones are all like those of the United States. It has wide streets and fine parks, hotels, clubs, schools, and churches, and one of the finest aquariums in the world. But outside of the business center, luxuriant gardens with tropical flowering trees everywhere border the streets, and Europeans and Americans are few compared to the thousands of picturesque Orientals and mixed-blooded Hawaiians. There is a "Chinatown," where the streets are lined with queer little shops and filled with gaily clad Chinese men, women, and children. At other places you find Hawaiian girls sitting on mats on the sidewalk, making and selling wreaths and ropes of flowers ("leis") which the Hawaiian women wear upon their heads and about their necks. They are dressed in bright-colored "holokus,"—wide "Mother Hubbard" dresses, which the early missionaries devised for the scantily clothed natives, and which are still worn today. Everywhere one meets the Japanese (who compose nearly half the population of the islands), returning from the sugar

WHY HE LOOKS THAT WAY



What an ugly expression! It's because this feathered mask represents the ancient Hawaiian God of War.

mills or from their work in the fields, or selling fruit suspended in two baskets from a bamboo pole.

Six miles west of Honolulu is Pearl Harbor, a United States coaling and naval station, and one of the finest land-locked harbors in the world. On its flat eastern banks stand government buildings, barracks and shops, and a great dry dock; and in the water you may find gray battleships and cruisers, resting for a day from their voyaging in the Pacific. By dredging the channel, which was barred by a coral reef, Pearl Harbor has been made available for the largest vessels now afloat.



A LITTLE KANAKA

This is a young native of Hawaii or a Kanaka, as he is called at home. His race, once one of the sturdiest in the Pacific, is fast disappearing. Kanakas have reddish-brown skin, dark hair, large expressive eyes, and very white regular teeth.



THE CITY AND THE SEA

The central picture shows a scene in Honolulu, the capital of the islands. The streets are wide and paved with crushed lava. Below is a view from the beach. One of those skillful surf riders is coming in standing on his board. When the surf is high they go at the rate of 40 miles an hour.

A trip on the railway that follows the narrow coast around Oahu takes you through a sea of waving plumes that make up one of the many large sugar plantations spread over the lower slopes and valleys. Sugar forms almost nine-tenths of the exports of the islands, which have the largest yield per acre in the world. On the more elevated lands are great fields of pineapples, which in value constitute the islands' second industry. This fruit is famed for its delicious flavor, and is exported, raw or canned, to all parts of the world. There are also fields of sisal hemp, each plant looking like a rosette of spears; and "algaroba" forests (a species of locust) where the bees are kept that supply tons of honey to England each year. Everywhere we go we notice little "taro" patches, and often see men and women working in them, standing up to their knees in water. The beetlike root of this plant, after being baked, pounded, and mixed with water, forms a thick fermented paste called "poi," which is the principal food of the islanders.

From Oahu, the third of the islands in size but the greatest in population and wealth, a coast steamer will take you south to Hawaii, which is larger than all the other islands together. On the way you pass the island of Molokai, famous for its leper settlement on a jutting peninsula in the north, and Maui, the second island in size, with some of the most important plantations. You pass also Kahoolawe and Lani, small islands given over entirely to cattle- and sheep-raising. Finally the coast of Hawaii comes into view, and you disembark at Hilo, a little city of about 10,000 people, the island's only port. Beautifully situated on a broad smooth bay with two superb mountains in the background and luxuriant tropical gardens throughout the town, Hilo has many attractions that fully compensate for its reputation of having rain "eight days in the week."

WHERE THE DELICIOUS PINEAPPLES GROW



After you have passed through the large sugar plantations on the lower slopes and in the valleys of the Hawaiian Islands, you come on the more elevated lands to these vast fields of pineapples. The pineapples of Hawaii are especially noted for their delightful flavor and are exported, raw or canned, to all parts of the world.

THE "CROSS-ROADS" OF THE PACIFIC



This map shows the Hawaiian Islands stretching 400 miles across the mid-Pacific. The inset shows Honolulu, and Pearl Harbor six miles away. Formerly the coral reef was continuous, but the bar at the entrance of Pearl Harbor was removed and the harbor is now a naval station, one of the important strategic points guarding the Pacific coast of the United States.

The entire island has much to charm the sightseer in its snow-capped mountains and tangled tropical forests, its deserts and sparkling water-falls, its lava flows, and its plantations of coffee and sugar; but it is chiefly for its marvelous volcanoes that thousands of people visit Hilo each year. Not only is Kilauea the second greatest active crater in the world, but it is one of the most unusual. On its great lake of molten lava, waves of fire toss and battle with each other, and dash against the black sides of the pit, making a brilliant spray. Yet Kilauea, like Mauna Loa and the other active craters, is excellently behaved, having thrown out neither stone nor ashes since it destroyed the army that was marching against King Kamehameha 150 years ago. When lava does break out far up on the uninhabited slopes, it cools as it runs and so approaches the sea only at the rate of a few yards a day.

Returning to Honolulu, a coast steamer will take you north to Kauai, called the "Garden Island" because of its prosperous plantations of sugar, rice, and pineapples. It was here that Captain James Cook first stepped on Hawaiian soil, in 1778. The people thought him and his crew supernatural beings, and sent messengers in the swiftest canoes from end to end of the island with word of the strange visitors. The next year Captain Cook lost his life in an attack by the natives while he was attempting to recover a stolen boat (*see* Cook, Captain James).

Cook called the islands the "Sandwich Islands" after his patron, John Montague, the fourth earl of Sandwich, the head of the British Admiralty office; but "Hawaii," the name used by the natives, is the one by which they are now known. Although not the first white man to visit the islands, Captain Cook's famous journals first made their geography known to the civilized world. The islands were then governed by chiefs who constantly waged war against one another. Shortly afterward (1795) they were all united under the famous King Kamehameha I, whose descendants reigned for almost 100 years. Many missionaries came to the islands from America and Europe, the first being sent from Boston in 1820, and through their efforts the people were taught reading and writing and converted to Christianity. In 1893, when Queen Liliuokalani attempted to abolish the constitution which King Kamehameha III had been forced to give to the people, a revolution took place. The queen was deposed and application was made for annexation to the United States. President Cleveland, however, withdrew the annexation treaty from the Senate when he took office, on the ground that the United States diplomatic representative, backed by marines landed from a naval vessel, had improperly aided the revolution. Hawaii was then organized as a republic, in 1894, with Sanford B. Dole, as president. Four years later, when the Republican party again came into power with President McKinley, an annexation treaty was concluded. The islands now form the Territory of Hawaii, with a governor appointed by the President of the United States, a territorial legislature, and a delegate to represent the territory in the United States Congress.

The native Hawaiian population has greatly decreased since the introduction of new diseases and new methods of living by the whites, so that they now form only one-sixth of the total population. The Japanese are by far the largest element, and there are also many Chinese and Filipinos. The Americans and Europeans form one-fifth of the population. Most of the dark-skinned whites are listed as Portuguese. All Hawaiian citizens, including Asiatics, also possess the rights of United States citizenship.

The primitive customs of the Kanakas, or native Hawaiians, have largely disappeared, along with the grass huts of early days and the old religious beliefs. Most of the natives live in wooden houses, and some have fine homes. English is the prevailing language. Like all the Pacific Islanders, the Hawaiians are a musical people, and in recent years "Hawaiian music" has had a wide popular vogue.

HAWK. Until recently all hawks had the ill-will of every farmer and sportsman because of the havoc which some members of this large group work among poultry and other birds, but careful study has shown that all but three species do more good than harm, by destroying enormous numbers of small rodents and insects that are harmful to grain, fruit trees, and birds. The true bird-killers and the only ones that deserve the name "hen-hawks" are the sharpshin hawk, Cooper's hawk or the blue-darter, and the goshawk. These are bold marauders and do most of the mischief that is attributed to the hawk group. Their trade is battle, murder, and sudden death, and they fully deserve the death sentence that has been passed on them. About 450 distinct species of hawk are recognized, but only 34 are found in the United States and Canada. All are day-seeking birds of prey and possess remarkable keenness of vision, great swiftness of flight, and immense clutching power. They are distinguished from the vultures by the fact that they rarely taste anything they have not themselves killed. Most of them are plainly dressed in browns and grayish whites with darker markings, and are unadorned with plumes. They lack a singing voice, their call resembling a harsh scream more than a song. According to species, they nest on the ground or in trees.

FATHER HAWK ON GUARD



It seems that the Marsh Hawks feel perfectly able to defend their homes, for they build nests on the ground without much attempt at concealment. The male hawk helps in the building and in feeding the babies. Here the male is shown guarding the eggs. Even young hawks in the nest will fight if you attempt to touch them.

The sharpshin is the smallest of the three pernicious hawks. It is a bird about 11 inches long, bluish gray above, and white, heavily barred with brown, beneath. Although no larger than a robin this murderous little villain will destroy all the small birds in its neighborhood, from the flickers and doves to the tiny warblers. It is partial to chickens, and often exterminates whole broods.

Cooper's hawk, which is about one-third larger than the sharpshin, is even more fierce and destructive. It will snatch a young chicken from before the eyes of the farmer and be off before he can recover from the surprise. It not only carries off good-sized fowls but even grouse and rabbits.

contained in the Easy Reference Fact-Index at the end of this work

The goshawk is twice the size of the sharpshin and is the boldest and most destructive of all. This bird has been known to snatch a wounded game-bird from beneath the feet of the hunter. The young goshawk, which is even bolder than its elders, is sometimes confused with the harmless red-tailed hawk, because of its brownish plumage. Fortunately these savage birds are rarely seen in the United States except in winter, as they spend the warm seasons in the far North.

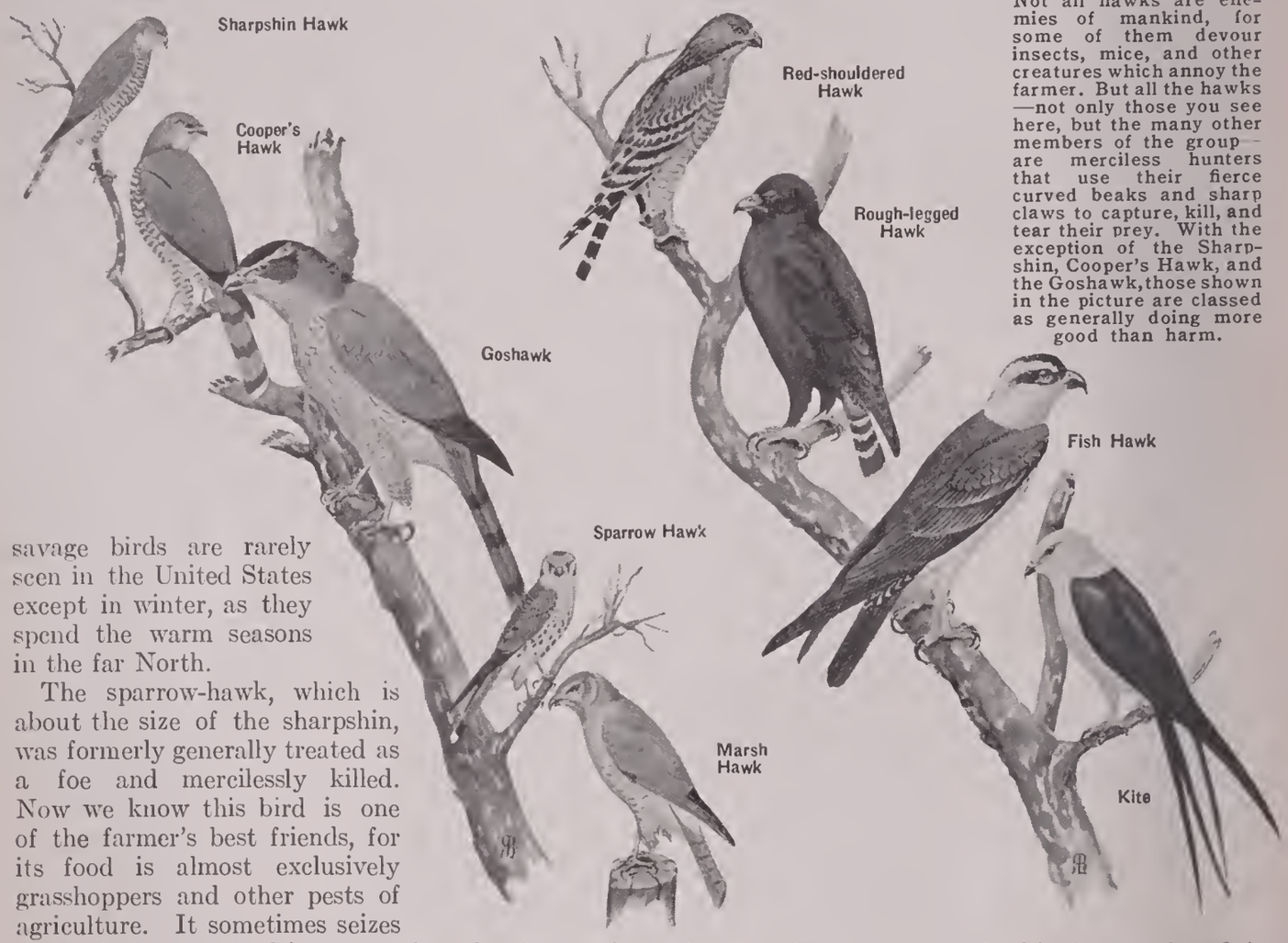
The sparrow-hawk, which is about the size of the sharpshin, was formerly generally treated as a foe and mercilessly killed. Now we know this bird is one of the farmer's best friends, for its food is almost exclusively grasshoppers and other pests of agriculture. It sometimes seizes small chickens to feed its young, but the damage it does is nothing in comparison with its services.

The sparrow-hawk is one of the varieties properly classed as *falcons*. These are distinguished from other hawks by having the beak hooked at the point, with a notch or tooth on the cutting edge of the upper mandible. They are the most perfectly developed of all birds, remarkable for their strength, symmetry, and powers of flight, and were the birds chiefly employed in the sport of falconry, which was one of the most popular amusements of the Middle Ages. With "hooded" falcons on their gloved wrists, the hunters would sally forth in search of game birds. When the "quarry" was sighted, the falcon's hood was slipped and it was thrown into the air, to dart like an arrow at the prey, plunging its talons into it and crouching over it until the hunter galloped up. The most prized falcon was the peregrine or duck-hawk, which is today so rare and shy that its depredations are inconsiderable. This falcon was reserved exclusively for the use of earls, while only royalty could hunt with the great gerfalcon. (For illustration in colors of sparrow-hawk, *see* Birds.)

Nearly all of the buzzard-hawks are valuable allies to the farmer and sportsman, although they have been made to suffer for the sins of their buccaneering relatives. These are mostly big heavy slow-flying birds, with long broad wings and a broad tail, while the falcons have shorter tails and long, pointed wings. Among the most serviceable varieties that should be carefully protected are the marsh-hawks, which are said to destroy an average of 500 field mice apiece during the nesting season; the red-shouldered and the red-tailed hawks, often unjustly called chicken-hawks; and the rough-legged hawks, which are feathered down to the toes and come to the United States in winter to range the fields in search of mice. Some of these friends of the farmer may occasionally seize a chicken to feed their young, but the damage is made up many times over by their services.

The fish-hawks, or ospreys, are close relatives of the hawks and falcons, but they live exclusively on fish. They are found on all the continents near the ocean or other large bodies of water. They cannot dive, as the ducks do, but catch fish by pouncing on them

A GROUP OF FIERCE AIR PIRATES



Not all hawks are enemies of mankind, for some of them devour insects, mice, and other creatures which annoy the farmer. But all the hawks—not only those you see here, but the many other members of the group—are merciless hunters that use their fierce curved beaks and sharp claws to capture, kill, and tear their prey. With the exception of the Sharpshin, Cooper's Hawk, and the Goshawk, those shown in the picture are classed as generally doing more good than harm.

from a great height and seizing them in their talons. The sea-eagles, especially our own bald eagles, often rob them of their prey by swooping down on them and forcing them to drop the fish or be caught themselves.

Kites are medium-sized birds closely related to the buzzard-hawks, though with weaker grasping power in their slender feet, with forked tails, and long pointed wings. The swallow-tailed kites of the southern United States are the most graceful and beautiful in flight of all North American birds. They seem to live almost entirely in the air, floating and soaring with superlative ease on their powerful wings, and even eating and drinking while in flight.

Eagles, hawks, and kites compose the family *Butuonidae* of the order *Raptores*. Scientific name of sharpshin, *Accipiter velox;* marsh-hawk, *Circus hudsonius;* sparrow-hawk, *Falco sparverius;* fish-hawk, *Pandion halaetus;* swallow-tailed kite, *Elaneides fortificatus.*

SOME DAY THEY'LL WEAR RED



When these three little "Red-shouldered" Hawks grow up, they will have their suits made with little patches of reddish feathers at the top of their wings.

HAWTHORN. In his pictures of happy scenes Milton remembers the hawthorn—

> And every shepherd tells his tale
> Under the hawthorn in the dale.

Many other English poets have commemorated the charm of this lovely shrubby tree, which has long been a favorite in England for gardens and hedges.

The hawthorn grows wild throughout Europe, in northern Africa and western Asia, and was introduced into America by the colonists. It rarely reaches a height of 25 feet. It forms a dense growth of handsome foliage, which in most species turns to brilliant colorings in the autumn. In the early spring there is a profusion of fragrant bloom, sometimes tinged with pink but usually white, "white as the hawthorn buds that ope in the month of May." The English often call the hawthorn "may," and use the flowering branches for May Day decorations. The fruit, known as "haws," and usually red, with hard seeds, looks like miniature apples. In pastures the hawthorn seldom grows larger than a bush, as the grazing cattle are very fond of the leaves and fresh shoots, despite the numerous thorns. The wood is very hard and is valuable for making mallet and hammer handles and other implements. The bark was formerly used in Scotland in the making of black dye. Apple cuttings are often grafted on hawthorn stocks.

Numerous varieties have been developed by cultivation, differing in leaf, flower, and fruit. In England the flowers are extraordinarily sweet, but the American species are not so fragrant. Scientific name of the English hawthorn, *Crataegus oxyacantha.*

HAWTHORNE, NATHANIEL (1804–1864). "Hawthorne," says an American critic, "is without doubt the most perfect workman of all American men of letters." No one questions his right to the title of a genius. He was a true artist who took time and pains to make his language the perfect expression of his thought. Finely sensitive to beauty, he made his style delicate, simple, and pure. He had also a gift of penetrating insight into human hearts.

A native of Salem, Mass., he was a true New Englander, his ancestors having come to the New World in 1630. Born and bred in Puritanism, steeped in its legends and tradition, Hawthorne with his sensitive mind interpreted it as no one else could. His greatest book, 'The Scarlet Letter', is the story of sin and punishment and repentance in old Salem; and 'The House of the Seven Gables' is a study of the influences that shaped its characters.

Hawthorne's early life was of a sort to make him quiet and reflective. He was a lonely boy, for his father, a sea captain, died when he was four, and his mother shut herself away from the world with her boy on the shores of Sebago Lake in Maine. There he amused himself in walking, hunting, skating, having his books and his thoughts as his only company. His surroundings were much like the early environment of Cooper, but where Cooper saw the outward things of nature, Hawthorne turned his thoughts to the unseen and spiritual. Such a life gave him a shyness and reserve that he never overcame. Even when he went to college, at Bowdoin, where he was a classmate of Longfellow and the companion of Franklin Pierce, who later became President, he did not make many friends.

After Hawthorne left college he returned to Salem, where he lived almost like a hermit until he was 33. But he was very busy all this time, thinking and writing, though he published little. This long quiet time of preparation doubtless accounts for his depth of thought and perfection of style; for there is never anything crude or immature about his writing.

For a time Hawthorne lived at Brook Farm, where a group of literary men and women were trying an experiment in community life, and from this he got the idea for his 'Blithedale Romance'. He married Miss Sophia Peabody in 1842 and for a time they lived in Concord, Mass., in the "Old Manse," in intimate friendship with Thoreau, Emerson, and Margaret Fuller. Then, because he could not earn enough by writing to support his family, he took a position in the Salem custom house. Under the

HAWTHORNE READING TO HIS CHILDREN



Here is Nathaniel Hawthorne in his library reading from his 'Tanglewood Tales' to his little daughter Una, aged 9, and her brother Julian, two years younger. See how interested they look! Like so many other children, they loved these fascinating stories of the Greek gods and heroes, and could repeat most of them by heart before the book was printed.

influence of the old atmosphere that had so strongly touched his imagination, his thoughts began to take definite shape in the story that made him famous, 'The Scarlet Letter' (1850). After it was published, as he said, "fame was won," and his future was secure.

When Franklin Pierce became president he sent his old classmate as consul to England, so Hawthorne had a chance for European travel, visiting also France and Italy. Broken by ill health and saddened by the Civil War, he did not live many years after his return in 1860. The 'Dolliver Romance' he had never finished, and the manuscript was buried with him.

None of Hawthorne's novels could be called bright and cheerful, though they have touches of quiet humor. They are overhung with a sense of mystery and unseen influences. One of his favorite themes is sin and its growth, repentance and atonement—truly Puritan subjects. Many of his tales are symbols or allegories —such as 'The Great Stone Face'. On his stories for children he put the same care and thought as on his novels for older folk.

Hawthorne's principal works were: *Novels*—'The Scarlet Letter' (1850); 'The House of the Seven Gables' (1851); 'The Blithedale Romance' (1852); 'The Marble Faun' (1860). *Sketches and Tales*—'Twice-Told Tales' (1837); 'Mosses from an Old Manse' (1846); 'Our Old Home' (1863). *Books and Stories for Children*—'Grandfather's Chair' (1841); 'A Wonder Book for Boys and Girls' (1851); 'The Snow Image and Other Tales' (1851); 'Tanglewood Tales (1852).

HAY. "Hay, good hay, hath no fellow," says Bottom in 'Midsummer Night's Dream' while crowned with his ass' head; and he is certainly right from the standpoint of feeding farm animals, especially for use during the months when the pastures are brown and dead. In the United States the annual hay-crop is exceeded in value only by corn, wheat, and cotton. To produce the grand total of 100,000,000 tons, which is the approximate amount used annually in the United States, legumes such as clover, alfalfa, and cowpeas, grasses such as timothy, meadow grass, and brome grass, and even the cereal grains, rye, oats, and barley, are cut as fodder. The pasture-lands are covered almost entirely by native grasses, but the great bulk of the hay crop is furnished by these plants brought from foreign fields.

In order to keep a large portion of the sugars and other soluble matter stored in stalk and leaves by the growing plant, most hays are cut while the grass is still in flower and before the seed matures. If left standing too long, the stems and leaves rapidly lose their nourishment, becoming dry and useless for feed. Sometimes two or more crops may be obtained from the hayfield in a year. It is usually cut and left on the field about three days to dry or "cure" in the sun. When properly done, curing develops a desirable flavor and the characteristic aroma which makes the meadows "sweet with hay." To prevent it from drying too rapidly and to protect it from rain, it is raked into windrows or put up in cocks. About a week after cutting it is loaded in hay racks and hauled to the barn or stack. Hay tedders, hay rakes, and hay loaders greatly lessen the work and hay presses have come into quite general use to bale the hay because the bulkiness of the loose hay is a great disadvantage in storage or transportation.

The chief hay-producing states are New York, California, Wisconsin, Ohio, Iowa and Nebraska.

HAY'DN, FRANZ JOSEPH (1732–1809). The nickname "Papa Haydn," by which this great musician was familiarly known expresses the great affection in which he was held by all who knew him. He was a real father to his associates, as he was to all young and struggling men of talent.

Haydn's father, a mechanic of the town of Rohrau, in lower Austria, was a man of refined tastes. He was fond of music, and the evenings of Haydn's early childhood were spent listening to his father play the harp while his mother sang the folksongs of Hungary, the themes of which later found their way into some of the finest compositions of the master. The child showed marked ability along musical lines, and at the age of eight was made a chorister in the chapel of St. Stephen, in Vienna. Here for nine years he sang and studied, but at the age of 17 his voice broke. Because of some boyish prank, he was expelled from the school and found himself penniless in the streets. Ten long hard years followed. Hungry, cold, ragged, but always devoted to the art of music, Haydn struggled against poverty, and at last fortune smiled. He was made director of the orchestra of Prince Esterhazy, at that time the finest in Austria, and for 30 years he held this position. During this time his compositions were most numerous, and his fame as a composer spread to Leipzig, Paris, and even London.

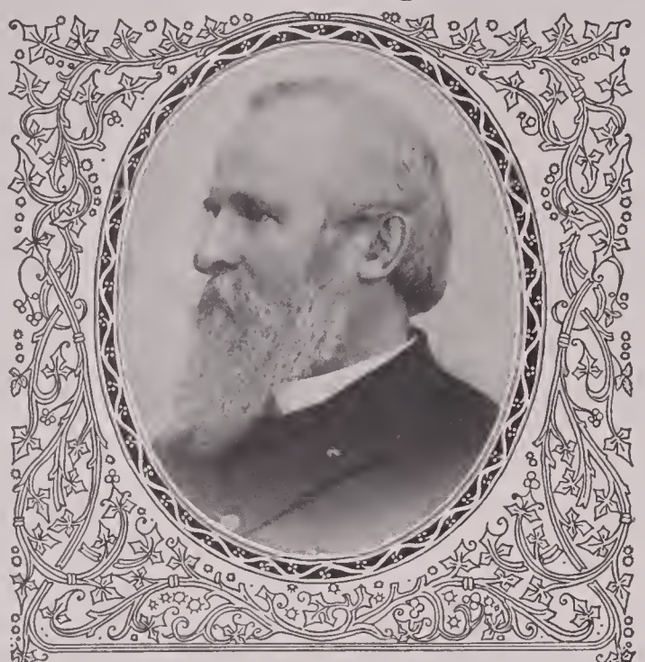
The friendship which sprang up at this period between Haydn and the great Mozart was one of great moment for both the composers. Mozart was so frank in his recognition of the younger man's work that he said he never heard one of Haydn's compositions without learning something from it, and called him "the greatest composer in the world." Haydn profited no less from the association, for it was from Mozart that he derived much of the mastery of orchestral effect that marks his later symphonies.

When 58 years of age Haydn visited England. He was received with the greatest enthusiasm, and Oxford University conferred on him the degree of Doctor of Music. During his stay of 18 months he produced his opera 'Orfeo', nine symphonies, and numerous other compositions, among them the accompaniments of more than 100 Scotch songs.

In his 66th year Haydn's great oratorio 'The Creation' was produced. Among the compositions of his declining years was the Austrian national anthem. He died in Vienna, during the French occupation of that city, and many French officers were among the mourners at his funeral.

Haydn's compositions are numerous, including 125 symphonies, 76 quartets (which are the most distinctive of his works), three oratorios, 54 sonatas, 16 masses, and many smaller pieces for the church.

PRESIDENT HAYES, *Valiant Fighter in War and Peace*



RUTHERFORD B. HAYES

HAYES, RUTHERFORD BIRCHARD (1822–1893). "The name of Hayes began by valor," wrote a member of the Hayes family in the 17th century, and the family tradition was worthily carried on by Rutherford B. Hayes, the 19th president of the United States. On the battle-fields of the Civil War, and equally in the White House at Washington, he displayed conspicuous bravery in overcoming difficulties and in fighting against great odds.

Hayes' administration is especially noteworthy for being ushered in by a dispute concerning the presidential election which was so bitterly contested that civil war loomed as a possibility. This was the only time in the history of the country that such a danger threatened, except when war actually came with Lincoln's administration. Hayes' term of office was also marked by the ending of the Reconstruction Period in the South through the withdrawal of federal troops, by the resumption of specie payments, and by the passage of the Bland-Allison silver act.

Rutherford B. Hayes was born in Delaware, Ohio, Oct. 4, 1822, and received a good education, which enabled him to fill well all the positions in which he was placed. In 1842 he was graduated from Kenyon College (Worthington, Ohio) as valedictorian of his class; and after three years more of study, in the law school of Harvard University, he was admitted to the bar of the State of Ohio. To the end of his life Hayes maintained his interest in education. When he was in Congress he worked to improve the Library of Congress; and after he retired from the presidency he served on the board of trustees of Ohio Wesleyan University, and of the Ohio State University. He was also a member of the board of trustees of the John F. Slater Fund for the promotion of industrial education among the negroes, and of the Peabody Education Fund for the promotion of education in the South.

His Service in the Civil War

Hayes' early interest in the negro was displayed when he cast his first vote for Henry Clay, in 1844, as an anti-slavery Whig. To this party he adhered until the formation of the Republican party, in 1856. When the Civil War broke out, following the Republican triumph in the election of Lincoln in 1860, Hayes immediately volunteered for military service, and was elected captain of a regiment which was raised by the literary club to which he belonged. He declined at this time a commission as colonel which President Lincoln sent him, but later accepted a major's commission. His courage on the battle-field was conspicuous, as was proved by several wounds received in notable engagements and his conduct in the battle of Winchester (Sept. 19, 1864), where he led his brigade through a deep slough in the face of the enemy. This gallant action won for him the admiration of his men, and the rank of brigadier-general. He was promoted later to the rank of major-general.

While he was still in the field (August 1864) he was nominated for Congress from his home district in Ohio. A friend urged him to apply for leave of absence that he might campaign for the position, but Hayes refused, saying: "An officer fit for duty who, at this crisis, would abandon his post to electioneer for a seat in Congress ought to be scalped." Without any effort on his part he was elected and served with ability. In 1866 he was re-elected, and before his second term had expired, he resigned to become governor of Ohio. Three times he was called upon to act as governor of that state. The last time that he was elected (in 1875) he stood on a platform calling for "sound money," in opposition to the Democratic policy of indefinitely postponing the resumption of specie payments and the policy of paper money.

The Famous Hayes-Tilden Election Dispute

It was Governor Hayes' position on this question that won for him the Republican nomination for the presidency in 1876 over James G. Blaine, with William A. Wheeler of New York as vice-presidential candidate. The Democratic candidate for president was Samuel J. Tilden of New York, who was also supported by many reform Republicans. Three states — Louisiana, Florida, and South Carolina — each sent in two sets of returns, one for Hayes by the "carpet bag" government, the other for Tilden, by governments set up by ex-Confederates. Both parties charged frauds on the part of their opponents. The Senate was Republican and the House Democratic, so the decision as to the disputed votes was left to an Electoral Commission, composed of five senators, five representatives, and

five justices of the Supreme Court. The decision—by a party vote of eight to seven, on every question—favored the Republicans; and Hayes was declared elected, by 185 electoral votes to 184 for Tilden. So bitter was party feeling that at one time it was feared that the government might be seized by force and the country plunged into a struggle of the kind so frequent in Latin-American countries.

A few days after he was inaugurated, Hayes braved the angry protests of leading politicians of his party by removing the United States troops from the South, thus ending the period of Reconstruction. This sealed the fate of the "carpet-bag" Republican governments which had made his election possible, and which could not exist without the protection of Federal soldiers.

President Hayes further angered the politicians who had put him in office by asking for an appropriation for a civil service commission. This was refused by Congress, but he nevertheless administered a heavy blow to the "spoils system" by granting many clerkships in executive offices on the basis of a competitive examination, and without regard to the politics of the applicant.

Though the politicians did not like these measures, the people did. The President's popularity was increased in many quarters by the unflinching determination with which he caused the resumption of specie payments. Many people in the agricultural Middle West were opposed to this measure and formed a third party, called the Greenback party. Its influence was increased by the support of a considerable labor group as a result of the severe business depression in 1876–77. Unemployment and reduced wages led first to violent strikes, later to political activity. In 1878 these two groups united in the Greenback-Labor party and elected 14 congressmen. Despite this protest and the strenuous objection of some of his party leaders, Hayes continued to accumulate a gold reserve, and on Jan. 1, 1879, for the first time since the Civil War, the government announced that it would pay out gold ("specie") in return for its paper money. The opponents of the government's financial policy succeeded, however, in passing the Bland-Allison Act over the president's veto. This provided that the government should coin each month from $2,000,000 to $4,000,000 in silver dollars to be full legal tender. Hayes vetoed this measure because the price of silver was falling and each dollar would contain only about 90 cents' worth of silver.

In foreign affairs the old Atlantic fisheries dispute with Great Britain was settled by the Treaty of Washington. In 1879 Hayes vetoed a Chinese exclusion bill, because it violated a treaty with China; but later he secured a new treaty which permitted Congress to regulate the immigration of Chinese laborers.

Hayes' constant antagonism to the politicians in Congress naturally made it hopeless for him to look for a renomination. He retired to private life with the end of his term (March 4, 1881) and devoted his time thenceforth to educational and social betterment. As president of the National Prison Reform Association he worked for a more scientific treatment of criminals, a labor which was probably as great a benefit to his country as was his presidential administration. He died at his home in Fremont, Ohio, on Jan. 17, 1893.

ADMINISTRATION OF RUTHERFORD B. HAYES
1877–1881

- **Civil Service Reform begun.**
- **Federal troops removed from the South and Reconstruction ended** (1877).
- **Fisheries dispute with Great Britain settled** (1877).
- **First electric lighting of streets** (1877).
- **Use of telephones begun** (1877).
- **Miners' strikes ("Molly McGuire" outrages) and railroad strikes** (1876–77).
- **Right of States to regulate railroad rates upheld** (1877).
- **Greenback Party at height of its power** (1878).
- **Bland-Allison Silver Act passed over the President's veto** (1878).
- **Resumption of specie payments** (1879).
- **Exodus of southern freedmen to northern states** (1879–80).
- **Not renominated because he had opposed Congressional leaders.**

HAZEL. Although the hazel furnishes effective little rods for hoops and baskets and crates, it is known chiefly for its nuts. Some cultivated varieties grown in Europe, such as the filbert, are collected for the market, but the two woodland species that grow in North America are mere shrubs or bushes and the nuts have little market value. These nuts lie in leafy cups in clusters of two, three, or four, and from their light brown shade we get the color term "hazel." The oil pressed from hazelnuts is used by perfumers and painters and in medicine.

In certain European lands the forked hazel twig was once believed to be a magic divining rod that could point to the place where precious minerals or other objects lay hidden, or where water might be found by well diggers. In North America this power was ascribed to an entirely different shrub—the witch-hazel.

The hazels belong to the bireh family (*Betulaceae*). Scientific name of common hazel, *Corylus avellana;* of American hazel, *Corylus americana.*

Workers who FIGHT OUR BATTLES *against Disease*



A NATION'S greatest asset is the health of its people, as the United States was made to realize in the World War when one-third of its young men between 21 and 31 were rejected for active service with the army on account of physical defects. No department of the federal government has more important duties to perform than the Public Health Service (a branch of the Treasury Department), with its trained workers all over the country who are constantly warring on dirt, contagion, and disease.

HEALTH DEPARTMENT. The work of protecting the nation's health begins at its borders. All the entrance ways into the country are guarded. Every ship that enters an American harbor is met by a revenue cutter flying the yellow flag of the United States Public Health Service, and if there is one case of yellow fever, smallpox, bubonic plague, or other contagious disease, it is forced to remain in "quarantine" for a specified time, during which passengers and crew are not allowed to land and cargo may not be discharged. Sometimes ships from foreign cities where these diseases are known to exist are not allowed to enter American ports at all. Immigrants are not allowed to come into the country if they have tuberculosis, or contagious diseases of the eye or skin.

The government health officers have thrown out their pickets far and wide. In Shanghai, Naples, and some 30 other places, trained "health scouts" are stationed to watch for contagious diseases and report to the home office. The American consuls stationed all over the world also report on health conditions to the Public Health Bureau in Washington. If plague breaks out in China today the Washington authorities know it at once, and notify the health police at all ports of entry.

When such diseases as yellow fever, typhoid fever, malaria, Rocky Mountain spotted fever, hookworm, and pellagra occur within the nation's borders, the causes are investigated and the best method of fighting them ascertained. One of the striking examples of government disease extermination was the triumph over the yellow fever and malarial mosquito in Panama. The story of this wonderful achievement which turned one of the plague spots of the world into a healthy locality is told in the article on the Panama Canal.

Local work is carried on by state and city health departments, which coöperate with the Washington authorities. Doctors are compelled to report all contagious diseases to the local health department, and those families in which there is smallpox, scarlet fever, or diphtheria are "quarantined," that is, a card is put on the house warning others to remain outside, while members of the family are not allowed to leave the premises. Children with measles, mumps, whooping cough, and chicken-pox are kept from school so the other children will not be exposed, and public schools

GUARDIANS OF OUR HEALTH AT WORK



Here we see some of the chief ways in which public health is safeguarded. Examination of immigrants for infectious diseases; vaccination; disinfection of clothing which has been exposed to contagion; food inspection; examining school children for tuberculosis; diagnosing germ diseases with the microscope.

contained in the Easy Reference Fact-Index at the end of this work

may be closed entirely in case of epidemics. After the patient is reported well, city health officers come and disinfect the house with formaldehyde or other disinfectants. Clothes that can be washed must be boiled. Rugs, mattresses and bedding, in some cities, are removed to the city's plant to be disinfected and returned.

Protecting Workers against Disease and Accident

Factories are inspected to see that workers are not overcrowded, that guards are put on machines to prevent accidents, that good light and air are supplied, and that children under a certain age are not at work for wages. Pure food laws are passed to prevent the sale of unfit food.

In cities, where so many people are living in such a small area, a great deal more is usually done to protect the health of the people than in the country where there is plenty of pure air and sunshine. The health department of a large city frequently employs several hundred people. The fight against dirt is constant, for dirt is the great disease breeder. Thanks to the vigilance of our health departments, the open garbage pail has disappeared, with the filthy piles of refuse and cesspools that once made many alleys and backyards breeders of disease. Many cities still cling to the abominable old-fashioned method of street-cleaning by sweeping the refuse and dust into piles and loading it into open carts, while the germs of a hundred diseases are scattered broadcast by every puff of wind. But modern ingenuity will speedily end this nuisance, too, for sanitary inclosed street-sweeping machines are now coming into use.

One of the first duties of a city health department is to insure a constant supply of pure water (*see* Waterworks). It is necessary also that milk, which forms the chief food of children and sick people, be safe, and strict laws regulate its production and distribution. Pure air is another thing we need if we are to be healthy, and the heavy pall of smoke that hovers over our cities is a problem on which all health experts are working (*see* Smoke).

Inspecting Food Supplies

Restaurants and bakeries are inspected periodically to see that the food is prepared in a sanitary manner. If there is a dirty factory or stable near you that breeds flies, the health officers will see that the place is cleaned, for flies carry disease. Bakeries, markets, cold storage houses, and fruit markets are watched to see that no spoiled food is sold. Plumbing and gas pipes are subject to city inspection, and if the owner does not make the necessary repairs his place may be closed to tenants. The health department is usually responsible also for keeping vital statistics, that is, records of births, deaths and their causes, the number of cases of contagious diseases, accidents and their causes, etc.

One of the best weapons of the health officer is publicity. By giving publicity to unhealthful conditions, the city pride is aroused and inefficient officers and shameless milk-dealers and food-law violators are shamed into enforcing and obeying the law. Much good, too, has been done by campaigns of education as to care of children, or against common drinking cups and roller towels, and other spreaders of disease.

Many city school boards employ school doctors and visiting nurses who examine the children's eyes, ears, noses, throats, teeth, and skin, watch for contagious diseases, and save many children who are in the early stages of tuberculosis. If the parents are unable to pay for glasses, for dental work, or for removing bad tonsils or adenoids, or for any other trouble, the children can be treated in free dispensaries and hospitals. Every city has public hospitals supported by taxes to take care of its sick, and many are beginning to build camp hospitals and sanitariums for people with tuberculosis (*see* Hospitals). To all these public agencies the Red Cross and many private organizations have added their efforts and resources.

Really effective work has only been possible since the bacterial nature of disease has been known (*see* Germ Theory of Disease). While a health officer's work formerly consisted in enforcing strict quarantine and in cleaning up nuisances which were offensive to the smell, today through the vast amount of knowledge possessed concerning infectious diseases, preventive medicine is an exact science. Every United States soldier in the World War was inoculated with serums which made him immune to some of the most deadly scourges of previous wars. The detection of many diseases is made in laboratories of state and national health bureaus, and better methods of treatment are constantly being discovered.

Terrible Conditions in "the Good Old Times"

In "the good old times" that some look back to with regret, there was virtually no care of the public health and frequent epidemics devastated whole cities and districts. One baby in three died. Middle age was toothless, on the average life was 20 years shorter than now, and unspeakable filth was tolerated. It would be impossible today to find such a combination of luxury and filthy, disease-breeding conditions as that in the midst of which Queen Bess and her courtiers held sway. Smallpox, until the discovery of vaccination in 1796 by Jenner, was as common as measles today. A 17th century writer remarks that in any gathering, the face of one out of every four would be horribly disfigured by the disease. At one time the "plague," a terrible disease which has its real home in China, was common in Europe, as also was leprosy, although these two hideous diseases are rare today in civilized countries (*see* Black Death). Yellow fever and malaria have been wiped out in places where they have raged for ages, by the extermination of the mosquitoes that carried them. Not very long ago a terrible disease broke out in Malta, and was known as Malta fever, but it was stopped when it was discovered that it is carried in infected goat's milk. The dread typhoid fever, the most dangerous of all filth diseases was looked upon, only

a few years back, as a disease that could not be prevented or controlled; but it can be almost completely wiped out by intelligent care. Indeed, it is a common saying that the intelligence of a community in sanitary affairs is indicated by the number of typhoid deaths. Cholera once swept frequently from country to country, and it was the great epidemic of 1848–49 that awakened the United States to the whole question of sanitation and fighting diseases coöperatively. Only a generation ago typhus was very common; now it hardly causes ten deaths in the whole of America in one year. But the disease is still common in backward countries of Europe and Asia; and in the World War it broke out in the trenches of the invaded countries.

The Fight against the White Plague

Tuberculosis is the most dreadful scourge that still afflicts the civilized world. The microbe that causes it was discovered near the end of the last century, and it has been learned that we catch it from one another and from other conveyors such as milk. The number of people who have tuberculosis is not so great in civilized countries as it used to be, and the number will be constantly less if we act on the knowledge we have. The health department watches that we receive no milk from tuberculous cows; we can be careful never to spit on the streets or in public places; most people keep their windows open at night; and it is not too much to hope that when the children who read this are grown, a case of tuberculosis will be as rare as a case of smallpox is today.

The next generation will realize, much more than this one, the importance of health and the right everyone has to it, and will understand the reason why health measures are advocated and why people should observe them. Everybody should be a soldier in the army that fights for good health and should see that statesmen and governments put it first in their programs for human betterment.

No better evidence of this worldwide importance of health could be given than the place it occupies in the business of the League of Nations under Article XXIII, for the health commission was one of the first to be instituted and put to work.

The LIVING PUMP *That Keeps* OUR BLOOD *Pulsing*

Some Glimpses at the Most Remarkable of all Engines, the Heart—An Engine which Never Sleeps, but Keeps Beating 100,000 Times Every Day of Our Lives—How It is Built, How It Works, and Some of Its Troubles

HEART. We have all heard the expression "getting to the heart of the matter," and "winning another's heart," and "losing heart" when we are discouraged. These common sayings would tell us, even if we did not know in other ways, that the heart holds a vital place in our lives. It is the pump upon which we depend to force the blood to the farthest extremities of the body, and when anything goes wrong with this pump, our very lives are endangered.

By the beating of the heart we can judge pretty accurately the well-being of the other organs of the body. For if any one of them is in trouble, the beating of the heart is usually affected. It either beats faster or slower, depending upon what is the matter. When all is well, the tiny baby's heart beats about 120 times a minute, while the grown person's heart beats only about 72 times. Small animals, like the rabbit, have rapid hearts; the baby in this matter behaves like a small animal.

Why Our Pulses Time the Heart Beats

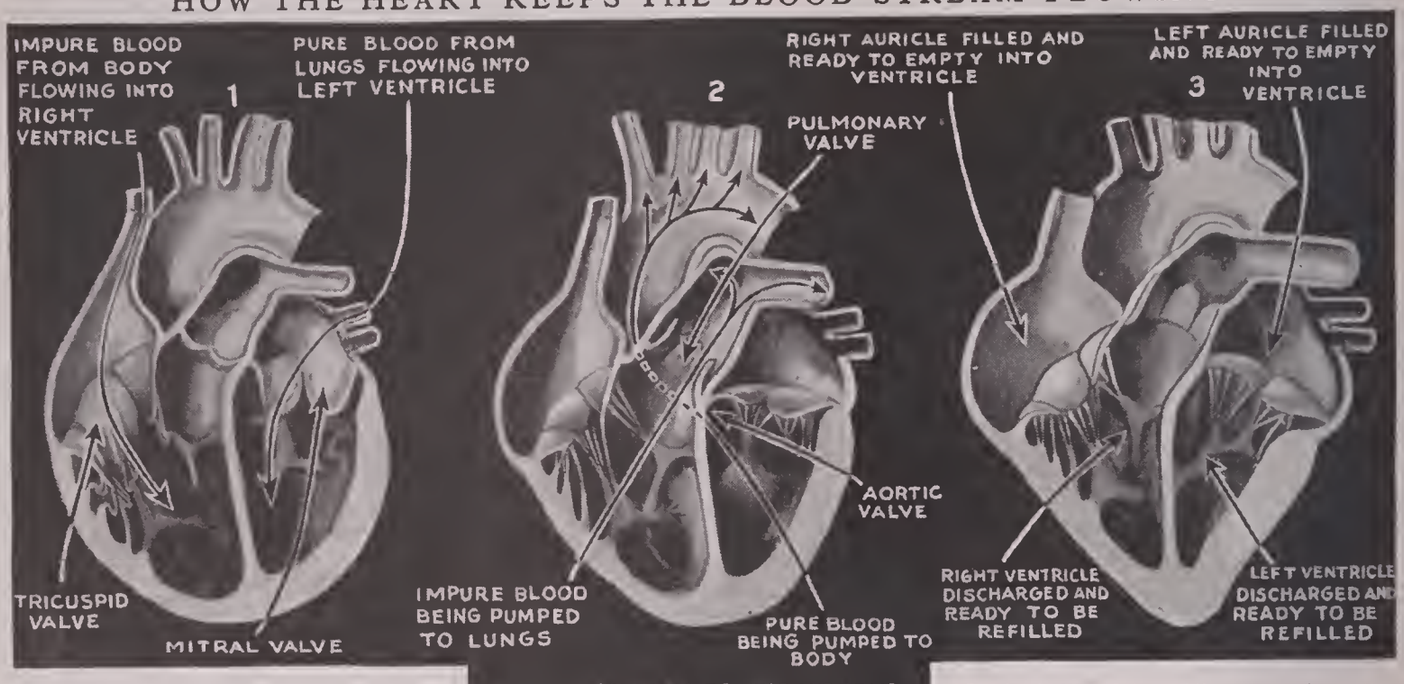
The arteries which carry the blood from the heart are like pipe-lines that have elastic walls. As a result we can plainly feel the beating of the heart at certain points on the outside of the body. The blood is forced into these arteries in a spurt, followed by a slight pause and then another spurt. The elastic walls of the arteries, in order to take care of each spurt as it comes, must stretch and then contract. So instead of a smooth flow of the blood, we have a wave-like motion, which we can feel. We call this the "pulse," and it can be most plainly felt on the wrist or at the side of the throat.

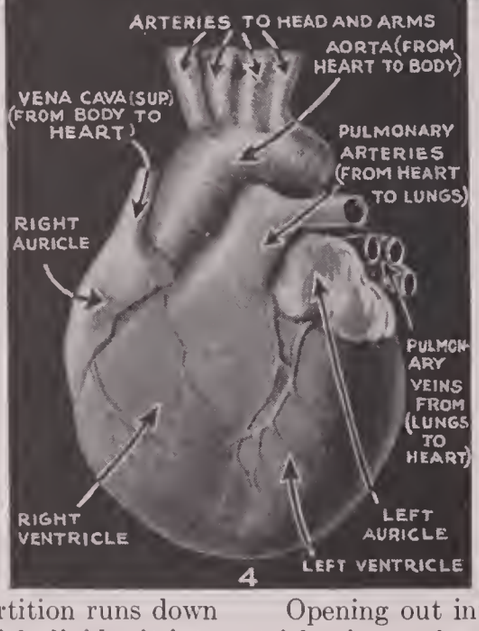
With the exception of certain simple forms, animals have an organ which does this same kind of work—from such low species as the earthworms, which have just a tube with muscular walls that can contract in a regular rythmic way; to the fishes with their two-chambered heart; snakes, frogs, and toads, whose hearts have three chambers; and the birds, brutes, and man, whose hearts have four chambers. From the way in which the heart is made we can trace something of the ancestry of an animal.

In the human body, the heart is located near the center of the upper or chest cavity. It is a pear-shaped—but slightly flattened—pouch, with very powerful muscular walls. The large end of this pouch points upward, and toward the right shoulder, while the small end points down and to the left. This end lies so close to the surface that we can feel it beat; hence we often speak of the heart as being on the left side, when in reality it is very nearly centered. In the grown man or woman, the heart is about 5 inches long and about 3½ wide. It weighs from 9 to 11 ounces.

We think of our hearts as working day and night, constantly and without rest. But this is not quite true. The real work is done in contracting; the relaxing at the end of each contraction is a passive process. Then there is a slight pause before the next contraction. These pauses and the relaxing preceding

HOW THE HEART KEEPS THE BLOOD STREAM FLOWING





In the lower picture (4) you see how the divisions of the heart are named and how they connect to various parts of the body. Impure blood from the body comes to the right auricle. From there it passes to the right ventricle, which pumps it to the lungs. Returning purified from the lungs, it enters the left auricle, passes to the left ventricle, which pumps it out again to the body. The pumping process, shown in the three upper pictures, consists of a contraction which works from top to bottom of the heart on both sides at the same time. In (1) both auricles are filled, the right with impure blood from the body and the left with pure blood from the lungs, and the beginning of the contraction is forcing the blood through the valves into the ventricles. In (2) the contraction has passed to the ventricles. The "back pressure" has closed the valves to the auricles, and is forcing the blood from the right ventricle to the lungs and from the left ventricle to the body. In (3) the contraction is finished. The ventricles have been discharged, the auricles have been filled, and an instant later the process will be repeated.

them total about 15 hours in every 24; so we can say that the heart works only nine hours a day. During these rest periods the heart feeds itself. Though it moves only about six ounces of blood at each stroke, it beats about 100,000 times in a day, so that the work done by it is equivalent to moving 12 tons in each 24 hours. The heart must be kept rested and fed, else its work is hindered.

The walls of the heart are made up of three coats—an outside coat; a middle one, which is a very powerful muscular layer; and an inner coat, very thin and delicate, which lines the heart and also forms part of the doors or valves. A partition runs down through the middle of the heart which divides it into two absolutely separate portions (the right and left sides). This really makes two distinct pumps, which work at the same time but handle somewhat different kinds of blood. Each side is again divided by a cross partition into an upper and a lower chamber. The upper chamber is called the "auricle" (right or left, as the case may be). The lower chamber is called the "ventricle" (right or left). In the partitions between the upper and lower chambers there are doors called valves. The door on the right side has three sections ("tricuspid valve"), and it is so hinged that the blood flowing into the lower chamber or ventricle will close the door when the chamber is full and prevent a backward flow. For the door will open only in one direction. On the left side the door between the auricle and the ventricle has only two sections ("mitral valve"). It is hinged and acts very like the door on the right side.

Opening out into an artery from each of the ventricles is another door made in three sections, and called the "semilunar valve" because it somewhat resembles a half-moon. These doors open and close automatically as the blood passes through. A physician with a stethoscope can tell by the sound of the valves whether they are working properly.

When we look closely at this double pump, we find entering the upper and right auricle large veins which have gathered up the blood from all over the system and brought it back to the heart. This blood is sadly lacking in oxygen and has much carbon dioxide, a waste material. Entering the right auricle, this dark venous blood passes on through the valve into the right ventricle and is then pushed by the contraction of the ventricle on through the semilunar valves into the pulmonary artery, which carries it to the lungs. Here it gets rid of this carbon dioxide and takes up the life-giving oxygen. It is then gathered up in the pulmonary veins and carried back to the

heart. Here it enters the left auricle. This cycle is known as the lung or "pulmonary circulation."

The blood now contains oxygen, and is ready to be sent all over the body. It is bright scarlet in color and is called arterial blood.

How the Pumped Blood is Distributed

On entering the left auricle, it flows (partially forced by the contracting auricle) through the door into the left ventricle, and from there is forced by the contracting ventricle through the semilunar valve into the "aorta," to be distributed all over the body. It passes through smaller and smaller arteries, until it finally gets into the thin-walled capillaries from which it reaches every cell of the system. These capillaries are the tiniest blood-vessels in the body, and it is here that the vital process of "osmosis" takes place, or the actual exchange of the fresh food for the accumulated wastes of the tissue cell. The blood is now ready to go back to the heart. It takes a drop of blood about half a minute to complete the cycle and get back to the heart. The circulation controlled by the pump on the left side is known as the "systemic circulation." And since it must send the blood so much farther, the muscular walls of the left ventricle are much more powerful than those on the right side. (*See* Blood; Physiology; Respiration.)

The heart is automatic; that is, it starts its own beat. But the action of the heart is regulated by two separate nerves. One, the "sympathetic nerve" makes it work faster, the other set of nerve fibers, known as the "vagus" nerve, behave in just the opposite way, tending to slow down the work of the heart. The two keep the action nicely balanced.

The heart may become diseased, mainly from one or two causes—either from overwork or by infection from bacteria carried by the blood. The infection often takes place in bad teeth or tonsils. The infected blood of necessity comes in contact with the delicate inside lining of the heart, and often causes an inflammation which prevents the valves from working properly. This inflammation may spread over the whole inside wall of the heart and bring about more or less serious results. However, the valves naturally suffer the most.

Danger of Overworking that Heart of Yours

We may overwork the heart by too violent exercise or too prolonged. This compels the muscle to work too rapidly, depriving it of its rest period, and hence cuts down the food supply of the heart itself. The heart may be permanently dilated or enlarged. Perhaps the valves get so crowded as to tear them and more or less permanently disable them, when a chronic disease is fastened on them. This is why we should never engage in violent athletic exercise immediately following a meal. The heart is already working hard to supply the digestive organs with extra blood, and if the muscles are put in action at the same time, the heart is overworked.

Anything which tends to disturb the fine balance or regularity of the heart-beat will produce trouble if kept up—possibly palpitation (a too rapid beating) or an inability to contract and expand properly.

The MARVELS *of* HEAT, *and* HOW MEN *Have* MASTERED IT

Once Thought to be a Substance, Now Known to be a Form of Motion—What Science Tells Us of Absolute Zero, and of the Heat of the Sun—How Heat Travels and is Measured, and the Wonderful Heat-Engines that Do Our Work

HEAT. Do you ever wonder what heat really is? Perhaps it would surprise you to learn that for centuries very learned men were puzzled by this question. They weighed a piece of metal and then heated it, only to find that adding heat did not increase the weight. They found, however, that adding heat did increase the *size*. So these wise men of old were led to believe that heat was a mysterious fluid, which was invisible, weighing nothing, but which could flow in some way from the hot body to the cold body. This fluid they called "caloric."

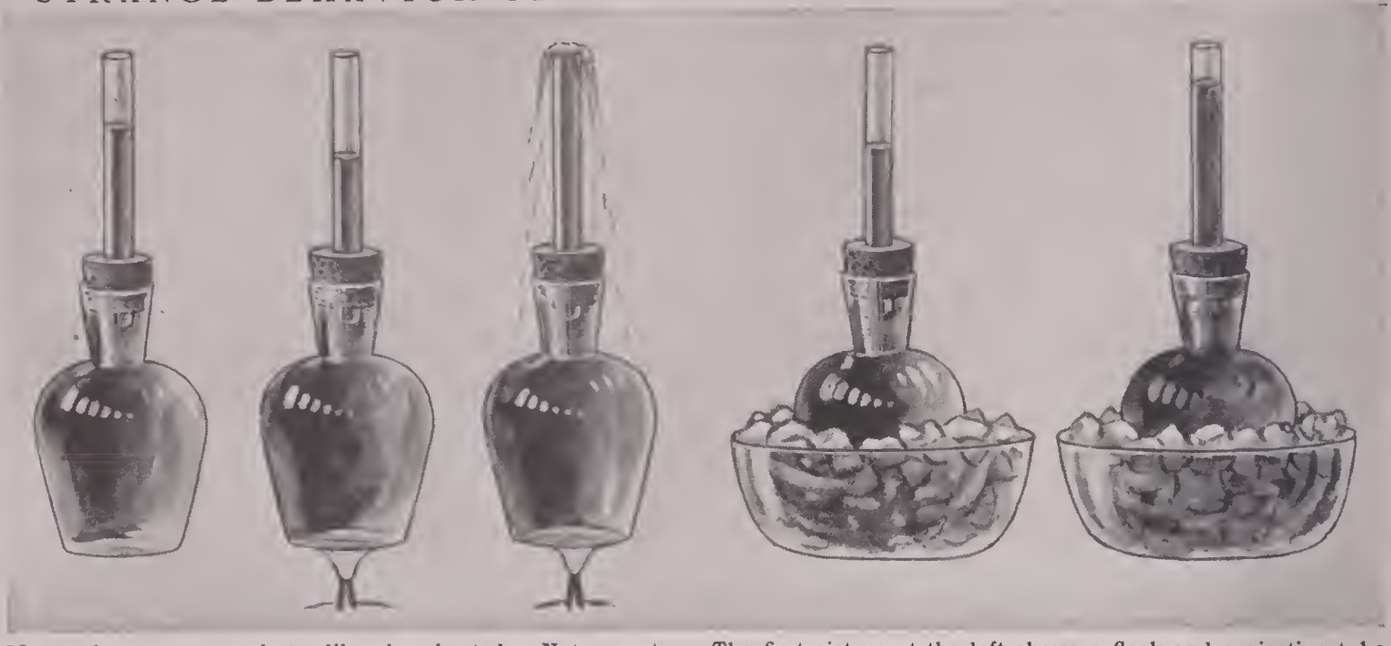
This idea that heat is a material substance was believed until almost the year 1800, and old textbooks in physics speak of "caloric" flowing from one body to another. Thus, caloric was said to flow from the hot coals to the kettle of water. Then in 1798 and 1799 two men, Count Rumford and Sir Humphry Davy, showed by experiments that heat could not be a material substance.

Count Rumford's name, before he was made a noble in Germany, was Benjamin Thompson. He is of special interest to Americans, for he was born in 1753 at Woburn, Mass., the son of an American farmer. He became one of the world's great scientists and engineers, and though he spent most of his life in Europe he did not forget his native land. In his will he left funds to Harvard College for a professorship, and Harvard College still has a "Rumford" professor of physical science, and there is a fund called the "Rumford Fund" to help work in the science of heat.

What a Cannon Taught about Heat

In 1798 Count Rumford wrote to the Royal Society of London an account of experiments that he made while boring brass cannon in Munich for the Bavarian army. He observed (what every machinist knows) that in boring metal the tool and the metal both get hot; but Rumford asked: "Where does this heat come from? What is this heat?" He insulated

STRANGE BEHAVIOR OF WATER WHEN HEATED AND COOLED



Most substances expand steadily when heated. Not so water. The first picture at the left shows a flask and projecting tube containing water just above the freezing point. Note where the water stands in the tube. In the next picture heat has been applied to the flask. The water in it starts to contract, you see. This continues until the temperature rises to about 39 F. (seven degrees above freezing). Then the water begins to expand again until it reaches the boiling point, illustrated by the third flask. The last two flasks show the effect of cold. The bowls are filled with cracked ice and salt, such as is used in making ice-cream. In the first of the two flasks the water is just beginning to freeze. In the second it has turned to ice, and expanded greatly during the process. The force of expansion when water turns to ice is enough to burst great iron pipes.

his brass block by felt, so that the heat could not come from outside; then he used blunt tools and got fewer metal chips, but got more and more heat but by using more and more mechanical work. In his account he wrote: "It is hardly necessary to add that anything which an insulated body can furnish without limitation cannot possibly be a material substance. It must be *motion.*" He meant the motion of the particles of the body.

Then next year Rumford's friend, Sir Humphry Davy, made another experiment to prove that heat was not a substance. He performed his experiment one freezing winter day. He arranged to rub two pieces of ice in a vacuum, and found that he could melt the ice by friction, even when all nearby bodies were below the freezing temperature. He then asked, "Where can this so-called 'caloric' come from?" The only answer was: "There is no substance caloric. Heat is simply motion given to the particles or molecules."

From these experiments of Rumford and Davy the world should have learned the true nature of heat. But it was not until 40 years later that the world realized the full truth of the ideas and experiments of Rumford and Davy. Then, in 1840, James Prescott Joule of Manchester, England, by churning up water and thus heating it, measured in long careful experiments the work needed to produce a unit of heat, that is, he got "the mechanical equivalent of heat." We know from Joule's work, which has been repeated by many others, that it takes 778 foot-pounds of work to produce a "British thermal unit" of heat.

Thus these great men, Rumford, Davy, and Joule, showed us what heat is. If you hammer a piece of iron it gets hot, because the blows of the hammer give motion to the molecules of the iron. You rub two dry sticks together, and under good conditions you produce heat—that is, you set the molecules in high motion, so that the wood catches fire. To explain heat, we must remember that all matter is made up of molecules, and that in all bodies, at temperatures that we know, the molecules are in constant motion. That is, all bodies that we know have heat.

Science has shown that if we could lower the temperature of a body to 459° below zero (Fahrenheit), then the molecules would be at rest—that is, the body would have lost all its heat. Such an intense cold as −459° F. (or −273° Centigrade) has never been reached; but a Dutch scientist, Professor Onnes of Leyden, Holland, has by elaborated machinery got down to about −453° F.; that is, to within five or six degrees of the "absolute zero" of coldness, where a body has absolutely no heat, no motion of its molecules.

Matter has some very interesting properties when its molecules have so very little motion. All gases become liquids or solids, even helium becoming a liquid; and the molecules of a metal near the absolute zero are so close together that a current of electricity finds no resistance. Of course life cannot exist at such low temperatures, for heat is needed to maintain life.

If, on the other hand, we add motion to the molecules of a body, we make it hotter. In the electric arc, we get the most rapid molecular motion that we have produced on the earth, a temperature of about 6,000° F. It is still hotter at the sun, the temperature of that body probably being more than 10,000° F.

For any subject not found in its alphabetical place see information

Two very practical questions for man about heat are: "How can we get heat, when we want it?" and "How can we transfer heat from place to place?" Our great source of heat is the sun. The sun continues century after century to send to the earth a constant stream of light and heat, by the method of radiation. Of radiation you will read later in this article. We cannot control the heat that comes from the sun; we can only use what Nature sends us. Different parts of the earth get very different quantities of the sun's heat, and the different seasons are due to the different quantities of heat received from the sun. In winter, in the most civilized countries, the sun's heat is not enough to keep our houses comfortable, so we must use artificial heat. We must also use artificial heat for cooking, and for producing steam for the engines in our factories and power plants and for our locomotives and steamships.

Our great source of artificial heat is found in the burning of wood, coal, oil, and gas. The oxygen of the atmosphere combines with the carbon and gases of the fuel, and in so doing releases energy which sets the molecules in violent motion—that is, produces heat. There are many other chemical actions that produce heat, but the burning of coal, oil, and natural gas is the great artificial source of heat. Think what we should do if we could not get coal or oil to produce heat! Our houses would be cold in winter, and our locomotives and all the other engines of the world could not run.

Another method of producing heat is by passing an electric current through wires (*see* Electricity), and many helpful devices make use of electric heating. Electric heating is, however, very expensive as compared with heat from burning fuels, and can never be a large source of heat. And besides, electric heating itself is in most places dependent upon the burning of coal or oil to run the steam engines that drive the dynamos. Heat from friction and impact also can never be available for large amounts of useful heat.

Heat travels in three ways: by *conduction*, by *convection*, and by *radiation*. When one end of an iron bar is placed in a fire, the rapidly moving molecules of the hot coals and hot gases strike against the iron molecules, and so the iron molecules that touch the fire are given violent motion. These first molecules pass the motion along to other molecules farther back in the iron; and soon the heat travels or is *conducted* to the hand that holds the iron. That is, in conduction the heat motion passes along just as motion passes along a row of balls which bump against each other. The best conductors of heat are the metals. Wood is a poor heat conductor. This is the reason you can hold a burning match even while the wood burns only an eighth of an inch away. A metal wire would have to be several inches long for you to hold it in your hand when one end was red hot. We wrap steam pipes with felt and asbestos because felt and asbestos are poor heat conductors. We wear woolen clothes in winter because woolen cloth does not readily conduct the heat away from the body.

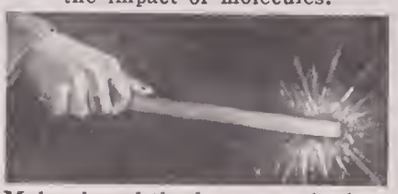
Now take the hot iron bar out of the fire. The air about it is heated, and the hot air rises. In this case, the heat travels upwards by *convection*—that is, by being conveyed by the currents of heated air. In the hot-air furnace for house heating, the heat is transferred to the rooms by convection—by the flow of hot air through the tin ducts. It is by convection, using the flow of steam or hot water through iron pipes, that heat is transferred in steam and hot-water heating systems. In convection, heat is conveyed by moving the hot matter itself as in the case of streams of hot air, hot water, or steam.

But heat can reach your hand from the hot iron bar when your hand is at some distance *beneath* the hot bar. There is no stream of hot air to the hand in this case, because hot air rises. In this case the heat travels neither by passing along from molecule to molecule, as in conduction, nor by the conveying of currents of hot matter, as in convection; but it flies directly across space. This is the way heat and light come to us from the sun across stretches of empty space. This method of transfer is called *radiation*. And what is radia-

FACTS ABOUT HEAT



Heat is created and transmitted by the impact of molecules.



Molecules of the bar carry the heat to the hand by "conduction."



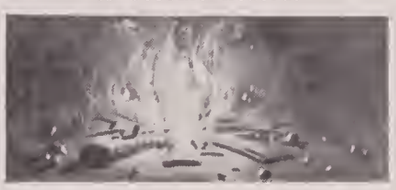
Heated air rises and spreads, carrying heat by "convection."



Heat travels in all directions by "radiation" through the ether.



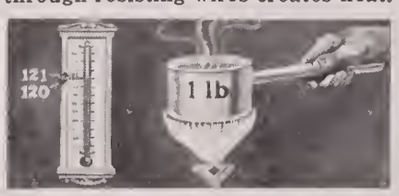
Impact between objects speeds up their molecules and so causes them to become heated.



The rapid motion of molecules undergoing chemical changes is the cause of heat in fire.



A heavy electric current passing through resisting wires creates heat.



The "British Thermal Unit" is the amount of heat needed to raise one pound of water one degree in temperature.

tion? Evidently it is not the same as the heat which is the oscillating motions of the molecules of matter, for there is no matter to heat in the long stretches between the earth and the sun. Experiments in the laboratory also show this, for radiation travels across a vacuum just as light does. Indeed, radiation is light. Light is a wave motion in the ether (*see* Ether; Light); but only a small part of these ether waves are visible to our eyes—that is, we have in the sunbeam both visible and invisible light or radiation. When these ether waves strike an object, they are partly absorbed and partly reflected. The energy of the absorbed radiation causes motion of the molecules of the body—that is, causes heat. Some bodies are better absorbers of radiation than others. Thus, a black cloth absorbs more radiation and reflects less radiation than a white cloth; hence dull black bodies get hotter in the sunshine than white bodies. This is one reason why people find white clothes cooler than dark clothes in summer.

HOW ICE MIGHT BE USED TO START A FIRE



If you were caught at the North Pole without matches, or flint, or other means for starting a blaze, what would you do for fire? If you knew enough about the nature of heat and radiation, it might occur to you to shape a rough lens out of clear ice, and with it concentrate the rays of the sun upon inflammable material, as you see this man doing.

How Radiation is Produced

Radiation—that is, ether waves—is produced by the vibrating molecules of hot bodies. As said above, radiations come from hot bodies, and the sun with its high heat gives off an amount of radiation which is enormous compared to any other source that reaches us. Every square foot of the sun gives off as much heat as would be produced by burning 1,500 tons of coal on each square foot every hour. These heat waves, being just like light waves, can be reflected and refracted. Thus, at the focus of a lens or "burning glass" there is gathered both the visible and invisible radiation, so that fire can be started by putting paper or shavings at that point. A concave mirror can be used for this same purpose of concentrating radiation. There is an old story that the Greek philosopher Archimedes of Syracuse set fire to the Roman war ships by the use of a big burning glass or burning mirrors (*see* Archimedes).

There are two measures of heat, the *degree* of heat, and the *quantity* of heat. The *degree* of heat we call the "temperature" of the body. The more rapidly the molecules vibrate, the higher the temperature. Temperature is measured by a thermometer (*see* Thermometers). Our most useful thermometer, the mercury thermometer, shows the temperature by the position of the mercury in the glass stem. This is graduated either in Fahrenheit degrees or in Centigrade degrees, as explained in the article on Thermometers. Two bodies can have the same temperature, and yet have very different *quantities* of heat—first, on account of the *mass* of the body, and second, on account of the *kind* of matter. Thus, a bucket of water will contain much more heat than a cup of the same water. Then again, experiment shows that it takes more than 30 times as much heat to heat a pound of water one degree as it does to heat a pound of mercury one degree. This property of a body is called its "specific heat."

Quantity, as distinguished from degree, of heat is measured in terms either of "calories" or of "British thermal units." A "calorie" is the quantity of heat or thermal energy used to raise the temperature of one gram of water one Centigrade degree. This is the unit used in most scientific work. A British thermal unit (*B. t. u.*) is the quantity of heat used to raise the temperature of one pound of water one degree Fahrenheit. The B.t.u. is the heat used in most cases by American and British engineers. Thus we read in an engineering paper that a certain kind of coal "gives 13,000 B.t.u. per pound of coal." This means that the heat produced by burning a pound of this coal is enough to raise 13,000 pounds of water one degree on the Fahrenheit scale.

We know by experience that mechanical work can produce heat. Indeed, if our engines and machines are not properly oiled, we get heat at the expense of work when we do not want heat. The reverse question is: Can we turn heat into mechanical work? This is just what James Watt and other great engineers have done with such wonderful results for modern industry. The steam engine and the gas engine are the wonderful heat engines which get mechanical power from heat. It is the science of heat that has given us these marvelous engines to turn the heat stored in coal and oil and gas into power, to run our factories, to light our homes, and to transport our goods and ourselves across land and sea and through the air.

Heather. The song and story of Scotland are filled with praises of the "bonnie blooming heather," which clothes the rugged Highlands with a soft vesture of purple, and mingling its delicate fragrance with the atmosphere enters into the very life of the people as perhaps no other plant has done in any land. Of it one Scottish poet sings:

O sweet is the breath of the heather
On braes of the Highlands that blows;
O rich is its bloom when at evening
The hills glow in purple and rose.

The heather—or "ling," as it is sometimes called—is found not only in Scotland, but also throughout northern and western Europe. It is a small evergreen shrub, sometimes rising only a few inches above the ground, but often growing to a height of three feet or more. On its purplish brown stems are close-leaved green shoots and feathery spikes of tiny bell-shaped flowers, usually rose-lilac in color, but ranging from deep purple to pure white. White heather, which is somewhat rare, is the most prized of all, and in Scottish superstition this beautiful plant is regarded as a bringer of good luck.

Not only does this hardy plant lend beauty to the landscape, but it serves many useful purposes. The tops afford winter forage for Highland sheep and cattle. The flower is a favorite of the bee and heather honey has a delicious flavor. The larger stems are made into brooms, the smaller into brushes. Owing to the scarcity of wood, the Highlanders in former times built their "shielings" or cabins of heather stems cemented with mud, and used it as a thatch; and heather laid on the ground with the small twigs uppermost formed a comfortable bed for the warrior, as it still does for many a shepherd and hunter.

The common heather (*Calluna vulgaris*) belongs to the family of plants called heaths (*Ericaceae*), from the fact that they grow on open tracts of poor and uncultivated land. There are more than 400 species, the greater number being found in South Africa; some of these species have flowers of large size and brilliant color. Other varieties grow in the Mediterranean region in Europe, and one of these (*Erica scoparia*) is used in making the so-called "briarwood" pipes. Heather like that of Scotland has been found in the eastern part of North America, but many scientists think it was introduced by early settlers. African species are sometimes cultivated as a garden or hothouse plant.

ARTIFICIAL CLIMATES *for Our Buildings*

Ingenious Equipment that Turns Winter into Summer in Our Homes, Offices, and Public Buildings—How the Heating Engineer Conquers Cold

Heating and Ventilation. "We deliver climates—hot or cold, wet or dry." This advertising boast of one of America's great makers of heating and ventilating equipment gives an idea of the wonders of this recent development of science. Until Benjamin Franklin invented the closed iron stove, the open fireplace was almost the only method of heating known, and this primitive and wasteful method is still the one used in most of the homes in England. But throughout the United States and Canada, heating by hot air furnaces, and by hot water or steam conducted through cast iron pipes has been so perfected that our homes and public places can now be kept at almost any temperature desired, regardless of the weather conditions. Furthermore, the related problem of obtaining sufficient supplies of fresh air has been worked out so completely that wherever homes or public places are badly ventilated, you can lay the fault to ignorance or carelessness.

The human body is continually manufacturing heat from the food it receives, but when the air is cold this heat escapes from the body faster than it can be produced. Hence clothing is necessary to prevent the heat from being given off too fast, and in cold climates dwellings must be artificially heated to supplement the heat of the body. To allow the bodily temperature to sink below normal (98.2 degrees Fahrenheit) weakens vitality.

The artificial temperature required to maintain the body in comfort and health varies with the individual's constitution and habits and age, but physicians consider a temperature of from 65° to 70° the most desirable. In England and most of the other temperate and cold regions of the world, people accustom themselves to home temperatures of 60 degrees or less. In the United States and Canada a higher temperature—70 degrees or more—is usually demanded.

To live in too high an artificial temperature is just as unhealthful as living in one too low. The great prevalence of colds, pneumonia, and throat affections in the United States is attributed largely to the habit of living in overheated rooms and offices. The body is weakened and rendered abnormally sensitive, so that it cannot properly perform its functions when it is suddenly exposed to the colder air outside.

Overheating is especially likely to occur where not enough attention is given to keeping the air properly

moist or *humidified.* Dry air introduced into a room takes up moisture from plants, furniture, and the human body, with the result that the plants die, the furniture warps and cracks, and human beings feel chilly and their throats and skins become dry and irritated. To make one feel comfortable in a dry atmosphere the temperature may have to be raised to 75 degrees or more, whereas with properly humidified air a temperature of 65 to 68 degrees will be sufficient for most persons suitably clad.

Getting Moisture into the Air

In modern furnace heating plants arrangements are made to introduce sufficient moisture by the use of evaporating pans. With steam and hot water systems it is harder to obtain proper humidity, for the common method of putting a pan on top of the radiators does not supply enough moisture. A large pan of water kept simmering on the kitchen range, with doors open to the rest of the house, will help; or a curtain may be suspended on a rod behind the radiator, with the bottom dipping in a pan of water. There are also various patent appliances on the market. Humidity is measured by an instrument called a *hygrometer,* one form being the wet and dry bulb thermometer. With such an instrument one can see whether the house has the proper relative humidity or not. Most American houses have only about half the humidity they should have.

Heating systems vary widely in efficiency. Most fireplaces allow seven-eighths of the heating value of the coal to be wasted up the chimney. Improved stoves, such as the base-burner, realize as much as 80 per cent of the heat value. Under ideal conditions, the hot air furnace will convert from 50 to 60 per cent of the value of the coal into useful heat. Steam and hot water systems are still more economical, and big heating plants scientifically constructed and tended realize 80 per cent of the coal value. It is claimed that a building that requires 12 tons of coal to warm it for a given time with a furnace will require only nine tons with the steam system, eight tons with hot water, and still less with the new vacuum or vapor methods. Such figures as these are of course not to be taken as absolute, as conditions will change them.

All methods of heating are classified as *direct* or *indirect* radiation. In direct radiation systems, the room is warmed by apparatus inside it, such as an open fire, a stove, or steam or hot water coils. In indirect systems the air is first warmed by a furnace, or by steam or hot water coils outside the room, and then brought in through an opening in the floor or wall called a register. A less common method is known as the *direct-indirect.* In this the steam or hot water coils are inside the room to be heated, but the air is brought directly from the outside into a sort of box at the base of the radiator and heated as it passes upward over the surface of the coils.

For small houses and buildings, the hot air furnace is still extensively employed. Such furnaces heat by indirect radiation. Cold air is brought by passages from outside the house or from one of the rooms, usually the hall; this is warmed as it passes over the heated surface of the furnace, and then distributed to the various rooms by a system of pipes, with registers which may be opened or closed to regulate the temperature. Furnace heating has the advantage of providing a constantly renewed air supply. It is open to the objections that more or less dust and fine ashes are brought up with the hot air, that upper rooms and rooms at a distance are harder to heat, and that its efficiency is affected by strong winds.

Hot water and steam heating systems employ a hot-water heater or steam boiler, a furnace, and a system of pipes and radiators. In the hot water system water heated to 140 degrees or more is circulated through the pipes on the principle that hot water is lighter than cold and therefore tends to rise.

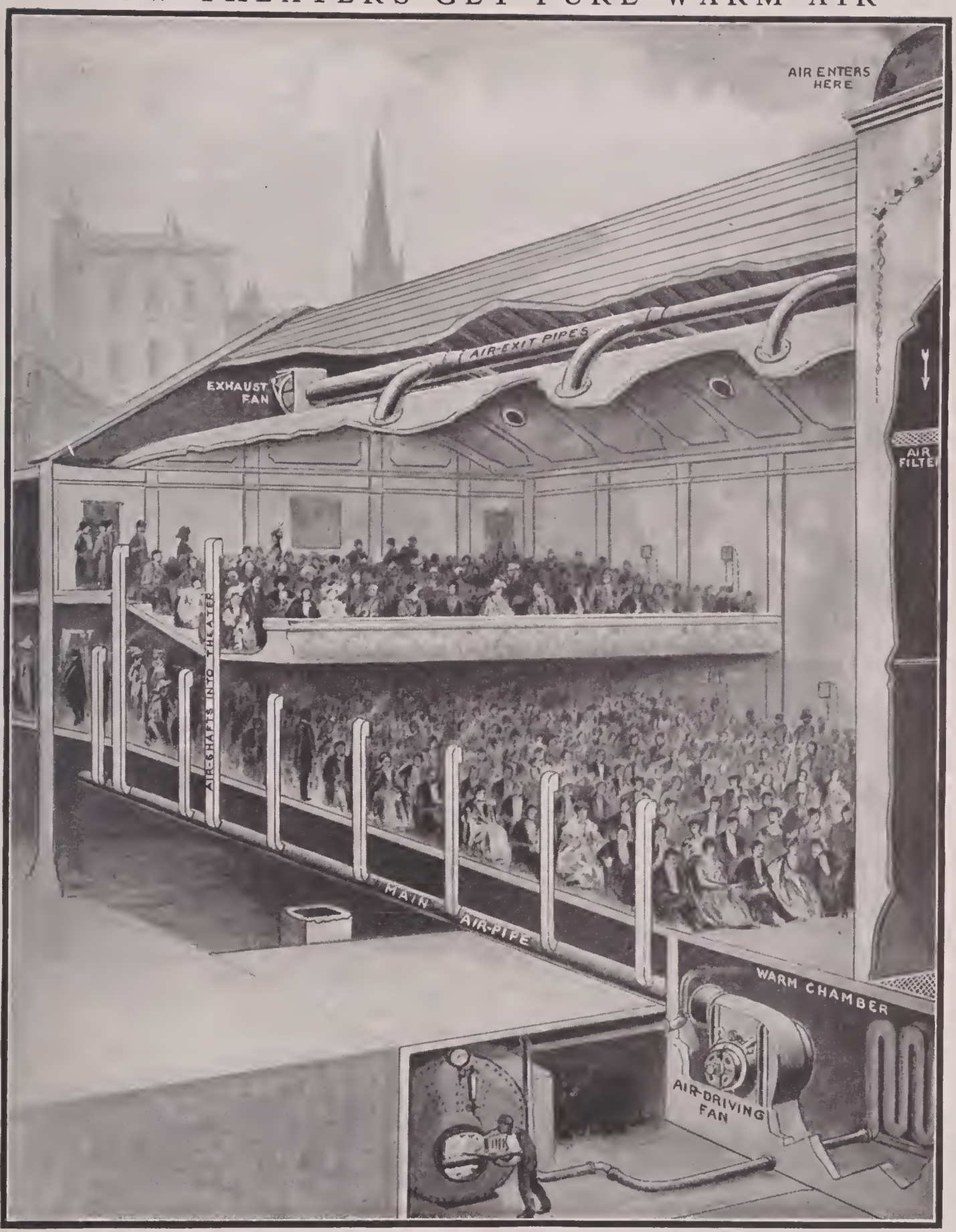
In steam heat, steam at a temperature of 212 degrees or more is circulated under pressure. When hot water is used, circulation begins and the radiators begin to give off heat as soon as the water is above the room temperature. In steam heat there is no heat in the radiators until the water in the boiler has been raised to 212 degrees and the steam has developed sufficient pressure to circulate in the pipes.

Hot water radiators give off only about two-thirds as much heat for each square foot of radiating surface as steam radiators do, so the pipes and radiators must be larger. The first cost of a hot water system is therefore greater than the cost of a steam heating plant. But it is cheaper to operate, for water will circulate with a very low fire and supply the amount of heat needed in mild weather, while with steam heating it is difficult to regulate the amount of heat in the radiators; usually there is all the heat the radiator will supply or there is none. Hot water radiators usually operate noiselessly, while in steam heating if not carefully designed the water sometimes condenses and lodges in pockets through which the steam has to force its way, thus producing a noise as if the pipe were being pounded with a hammer.

The Vacuum Heating System

The vacuum and vapor systems represent the most recent improvement in the art of heating. In steam heating a large part of the fuel has to be used to drive air from the circulating system. In *vacuum* heating the air is exhausted from the boiler and pipes so that the steam does not have to force its way against the pressure of the atmosphere. Furthermore, since the water is heated in a vacuum, steam is produced at a temperature as low as 98 degrees, instead of at the normal 212 degrees. The saving in fuel by this method is claimed to be 20 per cent over the regular steam system. *Vapor* heating is conducted on the same principle as vacuum heating, except that the apparatus is so contrived that the vapor produced from water below the normal boiling point—at about 90 degrees—is circulated before more than a few ounces of pressure is recorded by the gauge. In what is known as the *vacuo-vapor* system, the two

HOW THEATERS GET PURE WARM AIR



Here is a system widely used by heating and ventilating engineers for providing pure warm air in places where large numbers of people assemble. Huge steam-heated coils are placed in a small room near the boilers. Into this room fresh air is drawn from the outside, sometimes through water in order to wash it clean of dust. After the air has been heated by passing over the steam coils, it is pumped out by a huge electric fan and forced through a big main air pipe. From this main pipe, branch pipes rise which end in ventilators opening out into the walls or the floor of the theater. To make room for the fresh warm air, an exhaust fan draws out the old air through holes in the ceiling, thus keeping up a constant circulation. In hot weather a similar system, in which the air is cooled by passing over refrigerating coils, is often used.

contained in the Easy Reference Fact-Index at the end of this work

principles are so combined that the system may be operated at any desired point, from the lowest pressure of vapor possible up to a considerable steam pressure, thus giving a range of temperature for the radiators from about 90 degrees to 240 or more.

In some cities central steam or hot water heating plants supply heat for homes and business houses within a certain zone. This arrangement of community heating is both convenient and economical.

Use of Electricity for Heating

Electric heating is quite generally used in streetcars. In this system the heat is developed by passing an electric current through wires that offer great resistance. It is an expensive system to operate since less than 10 per cent of the fuel value of the coal is transformed into heat. If electricity could be obtained cheaply enough it would be an ideal method of heating, but so far its cost has made it prohibitive for any general use.

Gas is burned in fireplaces, stoves, and furnaces, but except in those regions where natural gas abounds it is too expensive to be used for heating a whole house. Gas heaters and electric heaters, however, are often used to supplement the regular heating plant. Gas heaters are objectionable because they consume too much of the oxygen in the air and give off carbon monoxide. Electric heaters are used to a large extent in closed automobiles.

It has been estimated that the supply of fresh air for each person in an ordinary living room should be not less than 1,800 cubic feet an hour. This means that in a room 12 by 10 feet and 10 feet high, in which there is only one person, the air should be changed every forty minutes. Where this is not done vitality is lowered, one feels chilly and sleepy, and often suffers from headache. Proper ventilation is especially important in sleeping rooms. Windows should be raised from the bottom and lowered from the top to provide a circulation of air even in the coldest weather. If the wind is too strong, screens may be used. In ordinary dwellings nearly enough fresh air is usually supplied by so-called natural ventilation, that is, by the drafts through doors, windows, etc.

In schools, theaters, churches, and hospitals, the allowance of fresh air should be greater than in an ordinary living room. This may be provided by drawing out the impure air (the *aspirating* system) or by forcing in fresh air by blowers (the *plenum* system). The latter method is more successful. The newer schoolhouses have very elaborate systems of ventilation which add greatly to the pupil's health and comfort, but in the rural districts many of the schoolhouses have no special device for ventilation and the air becomes very impure in a short time. It is one of the important duties of the teacher to meet this condition by raising all the windows during the intermissions and by using screens or boards fitted to the casing under the lower sash which will deflect the cold air upwards from the heads of the pupils when the windows are raised.

It is known with reasonable accuracy just how much heat will be lost by the windows, the outside walls, etc., and how much fresh air will have to be heated with proper ventilation. So, from the plans of the building, it is possible to figure with considerable accuracy just how large a heating plant will be necessary in a given climate.

The *thermostat* is a device used to regulate temperature automatically, and sometimes to sound an alarm when the temperature rises to a given point. The simplest of these devices is the ordinary mercurial thermometer. In this the upper end of the tube is not hermetically sealed, but is closed by an airtight plug of rubber, through which passes a metallic rod. Whenever the expanding mercury reaches the end of the rod, an electric circuit is closed and the current sets off an electromagnet, which opens or closes a register or regulates the draft in the furnace. A fire-alarm or a fire-sprinkler apparatus may be operated in a similar way.

Hebe (*hē'bē*). In the Greek mythology this goddess Hebe typified eternal youth and joyousness. She was a comely maiden, with sparkling eyes and rounded form, ever smiling; and Milton in his famous poem 'L'Allegro' speaks of—

> Nods, and becks, and wreathed smiles,
> Such as hang on Hebe's cheek.

She was the daughter of Zeus (Jupiter) and Hera (Juno) and served the gods as cupbearer, until one day she tripped and fell. Then the lovely youth Ganymede took her place, and Hebe became the wife of Heracles (Hercules).

Hebrew language and Literature. To most persons of European descent the chief representative of the Semitic tongues is Hebrew, the sacred language in which most of the Old Testament was written and in which its Scriptures are still read in the Jewish synagogues. The Semitic languages (a group of Asiatic and African tongues) are divided into two great branches, the northern and the southern. To the former belong Hebrew, Phoenician, Aramaic, and Assyrian, while Arabic and Ethiopic are of the second group. Hebrew and Phoenician are so closely related that they are considered as dialects of one tongue.

The Hebrew language is very ancient and was spoken in Palestine as early as 2000 years before Christ. The words are short, for the most part, and the grammar and sentence construction are simple. Much is expressed in a few words, and though often rude, the language is full of strength and grandeur, with a deep sonorous quality that makes it well suited to poetry and the expression of the deeper religious feeling. In common with other Semitic tongues the parts of speech are derived from roots or word-stems having three letters. Originally the Hebrew alphabet was made up entirely of consonants and the vowel sounds were omitted. Early in the Christian Era, however, vowel signs were inserted underneath the consonants as is done today in some systems of short-

hand. The writing reads from right to left, like Chinese, and from the back of the book to the front.

With the exception of parts of the books of Daniel, Ezra, and one verse in Jeremiah, which are Aramaic, the entire Old Testament is written in Hebrew. This and a few inscriptions are all that remain to us of ancient Hebrew literature. In their daily speech the Jews came gradually to use the Aramaic language of their Syrian neighbors, but Hebrew was preserved as a religious and literary language. In the first four or six centuries of the Christian Era there grew up a great body of writings known as the *Talmud* (meaning "teaching" or "learning"), consisting of two parts. The first of these, the *Mishna* or oral law, was written in Hebrew; and the second, the *Gemara* or commentary on the law, in Aramaic. The Mishna is a systematic collection of religious-legal decisions, developing the laws of the Old Testament. The Gemara is a great unordered mass containing arguments and opinions on the law, and much miscellaneous material—a "literary wilderness," it has been termed. Long discussions and hair-splitting arguments are often interrupted by charming tales and parables. In its pages are poems, prayers, anecdotes, and maxims, together with science and mathematics; tears and laughter are mingled, while side by side with the investigations of the learned are the wisdom and superstition of the unlearned. Despite its faults, the Talmud is a very great work. It formed a bond between the scattered Jews and kept alive their learning during the Dark Ages, making it possible for them to play a large part in the restoration of learning and the cultivation of science at the time of the Renaissance.

In the Middle Ages arose a body of literature embodying what is called the *Cabala*, a mystical interpretation of the Scriptures based on the assumption that every letter and number has a hidden meaning.

From early days the Jews have adopted the language of the country in which they happened to dwell. Even in the 1st century B.C., Josephus, the great Jewish historian, had written for the most part in Greek, probably because he could thus reach the greatest number of readers. His immortal 'History of the Jewish War' was written first in his native Aramaic and then in Greek, but only the Greek version has come down to us. Moses ben Maimon, or Maimonides, as he is generally called, the great Spanish Jewish rabbi, philosopher, and physician of the 12th century, wrote mainly in Arabic.

The Jews in Germany adopted German as their language, but they wrote it in Hebrew characters; and when persecution drove great numbers of them to the countries of eastern Europe, they carried this language with them. Mixed with some Hebrew and Slavic words, and written in Hebrew letters, this German dialect developed into the language known as *Yiddish* (from the German *jüdisch*, Jewish). It is widely used today among the Jews of Bohemia, Galicia, Lithuania, Russia, and other countries, being slightly modified by the addition of words from the languages with which it has come in contact. Within the last century, particularly, quite an extensive literature has developed, and there are a large number of newspapers and periodicals in Yiddish, in the United States as well as in other countries.

Although Hebrew ceased to be a spoken language, as a literary language it has never entirely died out, and in recent times there has been a revival of interest in it, as a means of communication between Jews in various parts of the world. Periodicals and books are appearing in Hebrew, which is now recognized as one of the three official languages of Palestine.

HEBRIDES (*hĕb'rĭ-dēz*) **ISLANDS.** Shortly before his death in 597, St. Columba the Irish missionary looked out upon the tiny island of Iona, one of the Hebrides or Western Isles of Scotland, and uttered a memorable prophecy. "Unto this place, albeit so small and poor, great homage shall be paid not only by kings and peoples of the Scots, but by the rulers of barbarous and distant nations, with their people also." And so it was. For this island of only five square miles became, through the work of St. Columba and his disciples, the most famous center of Celtic Christianity. From it missionaries were sent for the conversion of Scotland and northern England, and to it for centuries students flocked from all parts of the north. Kings and chiefs were brought to it for burial that their dust might mingle with that of the "blessed isle." From the end of the 6th to the end of the 8th century Iona's fame was scarcely second in importance to any of the British Isles. Then the Vikings swept down from the north, and not until the 13th century did the Norwegian kings give way to the Scottish kings.

Semi-feudal conditions continued until 1748, under the rule of native chieftains. Great depression followed the changes then introduced; rents became excessively high and large numbers of the tenants emigrated to North America. The potato blight in 1846 brought practically the entire population to the verge of starvation. Thousands were removed to Australia. Since then the system of land tenure has been revised and the hardships of the inhabitants' lot have been greatly lessened.

These islands off the west coast of Scotland are divided into two groups, the Outer and Inner Hebrides, by the ocean waterways of the North Minch and Little Minch. The most important of the Outer Hebrides are Lewis-with-Harris, North and South Uist, Benbecula, and Barra; of the Inner Hebrides, Skye, Rum, Coll, Tiree, Mull, Colonsay, Jura, Islay, Arran, and Bute. Altogether the Hebrides number over 500, but only 120 are inhabited. Of the total area of 2,812 square miles, only one-ninth is cultivated, the rest being moorland and mountain. Sheep-farming, cattle-raising, herring fishing, distilling, slate quarrying, and the manufacture of Scotch woolens provide the main occupations of the people. While the country is poor, the scenery is wild and picturesque, and numerous tourists add materially to its prosperity. Population, about 79,000.

HECATE (*hĕk'ă-tē*). The dark mysterious Hecate of the Greek mythology was a moon-goddess. As Artemis (Diana) represented the moonlight splendor of night, so she represented its darkness and terrors. She is often pictured with three bodies standing back to back, probably to typify the three phases of the moon. Hecate was also sometimes conceived as goddess of the underworld, frightful in appearance, with serpents in her hair and about her feet, carrying a lighted torch, and attended by two dogs. In this rôle she was worshiped especially by sorcerers and magicians. Shakespeare in 'Macbeth' represents the witches as aided by Hecate.

HECTOR. "Glorious Hector," the ideal hero of the Trojans, was the son of King Priam and Hecuba and the husband of Andromache. In the 'Iliad', Homer tells the story of Hector's valor during the siege of Troy by the Greeks, and of his death by the hand of Achilles. To avenge the slaying of his friend Patroclus, by Hector, Achilles tied Hector's body to a war chariot and dragged it around the walls of Troy, as is told in the accompanying story article. Hector is represented not only as a brave warrior, but as a devoted son, husband, and father. One of the most beautiful passages in the 'Iliad' is that which describes his final parting from his wife and infant son.

The Death of Hector



" 'My soul forbiddeth me to shrink away from battle like a coward', Hector answered, and he stretched out his arms to his boy. But the child shrank crying to the nurse, frightened at the gleaming bronze and the horse-hair crest that nodded fiercely from his father's helmet. Laughingly, the great warrior swept the helmet from his head, and taking his son in his arms, kissed him and prayed to the gods that he might grow to be a great man."

HIGH on the great tower of Troy stood the white-armed Andromache (*ăn-drŏm'ă-kē*), wife to Hector, bravest of the Trojan warriors. By her side stood a nurse bearing his infant son Astyanax (*ăs-tī'ă-năx*). All day long the dreaded Greeks had been pressing her countrymen hard, and she looked out over the plain before the city, weeping and wailing like one frenzied, for she feared the coming disaster.

Suddenly she caught sight of her dearly loved husband, who had come to the city to bid the elders and the women pray to the gods for help. Andromache ran swiftly to meet him and with her went the nurse and the child. She clasped her hand in Hector's and begged him with tears not to return to the battle.

"Come now, have pity and abide here upon the tower, lest thou make thy child an orphan and thy wife a widow."

But Hector of the glancing helmet could not be turned from the path of duty. "My soul forbiddeth me to shrink away from battle like a coward," he answered, and he stretched out his arms to his boy. But the child shrank crying to the nurse, frightened at the gleaming bronze and the horse-hair crest that nodded fiercely from his father's helmet. Laughingly, the great warrior swept the helmet from his head, and taking his son in his arms, kissed him and prayed to the gods that he might grow to be a great man.

With the return of Hector, the sun-god Apollo befriended the Trojans. So it was that, with the aid of this swift-arrowed deity, Hector killed Patroclus, the most loved of the friends of Achilles, who was the greatest warrior in Greece. Because of this, Achilles swore vengeance and went out to battle with the mighty Hector.

Once more, when Achilles entered the fight, the tide turned for the Greeks, and they swept the fleeing Trojans back to the gates of Troy. The massive portals closed, and all the Trojans were safe inside save Hector, who stood without the wall awaiting the coming of Achilles.

Now Hector was the bravest man in Troy, but when he saw Achilles, godlike and terrible in the shining armor which Hephaestus (Vulcan) had made for him, his heart was filled with a great fear and he fled. Three times around the city they ran, and neither lost or gained. As they came near for the fourth time, to the hot and cold springs where the maids of Troy were wont to wash their garments, the goddess Athena (Minerva), who loved the Greeks, whispered to Achilles to stop and take breath. She promised to bring about his meeting with Hector. Then she went to Hector, and taking the shape of Deïphobus, Hector's brother, said to him, "Wait, and we shall meet Achilles together. Thus shall you slay him."

Hector took heart and closed with Achilles. The Greek threw his spear, but Hector bent low and it flew past him. The goddess Athena returned the spear to Achilles, but Hector did not see this and, throwing his own spear, struck the shield of the Greek. It bounded back from the god-made armor. Turning to seize a second spear from Deïphobus, Hector found him gone, and knew that a god had tricked him. So, certain that he must die, he drew his sword and rushed toward Achilles, but the famed warrior bore down upon him like an eagle. His armor shone like the sun, and his spear-point gleamed as the evening star in the darkness of night.

With one thrust, Hector lay dead at the feet of Achilles. To take full vengeance for the death of Patroclus, Achilles fastened the body of Hector to his war chariot and dragged it round the wall of Troy. Andromache fell fainting into the arms of her maidens, as she stood on the wall and looked upon the dishonor done to the body of her husband.

Great was the weeping in Troy that the body of Hector had come into the possession of the enemy, for Achilles' heart was wroth and he would not give it up for any ransom.

Then to Achilles came his goddess-mother Thetis. "I am the messenger of Zeus (Jupiter) to thee, my son. The gods are displeased at thee because thou holdest Hector and hast not given him back. Come, restore him and take ransom for the dead."

And Zeus sent a messenger to King Priam, saying: "Be of good cheer, O Priam. Zeus, though he be afar off, hath great care and pity for thee. He biddeth thee ransom noble Hector and carry gifts to Achilles that may gladden his heart."

Hermes (Mercury), the wing-sandaled messenger of Zeus, guided Hector's aged father to the camp of the enemy. In return for gold and rugs, mantles and cloaks and caldrons, Achilles gave up the body of Hector.

There was a nine-day truce between the Greeks and the defenders of Troy, while the Trojans wept and mourned over Hector. With many tears they burned the body of their dead hero on a lofty pyre, and then buried his bones under a great mound of stones. "Thus held they funeral for Hector, tamer of horses."

—*Retold from Homer's 'Iliad', Books* vi, xxii, xxiv.

HEDGEHOG. The true hedgehog is common in Europe and, as indicated by its name, dwells in the hedges and thickets, rooting in the mold with its pointed snout for insects, snails, eggs, and the like, on which it feeds. When attacked it rolls itself into a ball, thus exposing no part of its body that is not defended by its sharp prickly spines. The common hedgehog of Europe (*Erinaceus europaeus*) is about the size of a large rat and other species exist which are even smaller. About 19 species exist in all, some of which lack the spines.



This little Hedgehog was frightened when he was picked up, and rolled himself into a tight ball. But now he's getting over his fright and peeking out.

No true hedgehogs live in America, but the name is sometimes given to the porcupine of the United States and Canada, for though much smaller in size it too has its hairs modified into a coat of stiff sharp spines.

HEDGES. These "fences of living green" are used for two purposes, defense and ornament. In the Old World they are still much used to protect fields in countries where wood is scarce, but in the New World the wire fence has replaced the hedge in usefulness.

No plant meets all the requirements of the farmers for an absolutely impassable barrier, although the Osage orange (*Maclura aurantiaca*) was widely planted at one time in the United States. Next to this, probably, ranks the honey locust (*Gleditschia triacanthos*), with its spiny trunk and branches, and its large flat ornamental pods, whose sweet pulp gives the tree its name. The hawthorn of Europe (*Crataegus oxyacanthus*) is subject to many fungus growths and is consequently not planted to any extent in America. A thorn hedge requires constant attention, for it must be kept free from weeds and pruned systematically.

The California privet (*Ligustrum ovalifolium*) is a general favorite where the winters are not too severe, as it holds its leaves nearly all winter and grows so close after repeated pruning as to form an almost impenetrable barrier.

Among the evergreens used for hedges the Norway spruce (*Picea excelsa*) is a great favorite. Next perhaps rank the American arbor-vitae (*Thuja occidentalis*), often incorrectly called white cedar, with its

short horizontal branches ascending at the end, and the common hemlock (*Tsuga canadensis*), the only one of the hemlocks that bears pruning well. The boxwood (*Buxus sempervirens*) is much used in the old formal gardens of Europe, and is sometimes trimmed in most fantastic shapes.

Many deciduous trees and shrubs also can be used for ornamental hedging. The flowering shrubs are especial favorites. Some of the most common are the varieties of *Spiraea* (bridal wreath), the Japanese rose (*Rosa rugosa*) which bears its single flowers all through the summer, the common lilac (*Syringa vulgaris*), and the great panicled hydrangea (*Hydrangea paniculata*). Several species of barberry (*Berberis*) are beautiful and hardy, especially the charming *Berberis thunbergii*, with its low dense growth, its brilliant autumnal tints, and the abundant scarlet berries which remain fresh until the following spring. Many species of barberry, however, are under ban owing to the enormous injury they do in harboring the rusts which blight the wheatfields (*see* Rusts and Smuts).

HEIDELBERG (*hī'dl-bĕrg̃*), GERMANY. Nestling between a wooded height and the beautiful Neckar River, which here leaves its gorge to enter the plain of the Rhine, this quaint university town is one of the most picturesque and interesting spots in Germany. The old city consists principally of a long narrow street following the course of the river for about two miles. It grew up at the foot of the castle begun in the 12th century, which crowns the wooded height in the background. Added to at different periods the castle became one of the largest and grandest in Germany; but it was largely destroyed during the devastating wars of Louis XIV of France, and though later rebuilt, it was struck by lightning and again ruined in 1764. But its ivy-clad ruins are still beautiful, and in an old cellar beneath the castle is the great "Heidelberg tun," an enormous wine cask capable of holding 49,000 gallons. The terrace commands a magnificent view of the surrounding country. Heidelberg University, which has been the alma mater of many noted scholars, was founded in 1385, and it is the oldest of German universities. Formerly the capital of the Palatinate, Heidelberg passed to the former grand duchy of Baden in 1803. Population, about 61,000.

HEINE (*hī'nĕ*), HEINRICH (1799–1856). "I am a Jew—a Christian. I am tragedy— I am comedy." This is what the most gifted poet in the Germany of his century said about himself. Heine was indeed a man of puzzling contradictions and inconsistencies, a true poet and a splendid journalist, a historian without method, a philosopher without a real philosophy, a hater of despotism and an ardent admirer of Napoleon, a cynic who laughed at sentiment, but was himself a sentimentalist. He was born of Jewish parents in Düsseldorf, in western Germany, but later joined the Lutheran church in order to practice his profession of law, which he had studied at the universities of Bonn and Göttingen.

Heine's heart, however, was in literature, not in law. During a visit to a wealthy uncle, his lifelong benefactor, he fell in love with a very beautiful cousin. His spurned love found expression in exquisite poems which were published and created a sensation in Germany. His outspoken liberal views together with his intense admiration for Napoleon made him feel uncomfortable in reactionary Germany. This disappointment in love and his political opinions combined to send him to Paris, where he felt at home.

Although Heine wrote much about philosophy, literature, and politics, his fame rests on his poems. Many of these lyric gems have achieved the popularity of folk-songs, and with good cause, for they have the true folk-song qualities. They are simple and full of warmth, and have the freshness and melody of the skylark's note. Almost every German man, woman, and child knows several of Heine's poems by heart. Some of them, such as 'The Lorelei' and the 'Two Grenadiers', are universally famous. His songs have been set to music by many famous composers. The capricious quality that pervades all his writings lurks even in his most tender poems. He shifts from intense passion to careless mockery. One of his delightful poems, 'My Child, We Once Were Children', pictures two children playing house in the courtyard and entertaining company, amongst them the neighbor's cat; and the sweet, pensive mood of the poem is broken by the satiric stanza:

> Politely we asked how her health was,
> In the course of a friendly chat.
> (We've said the same things since then
> To many a grave old cat.)

But it is in his prose writings that Heine's most sardonic flashes of wit appear. The 'Travel Pictures', the most popular of all of Heine's prose writings, strikes a new and fresh tone and is full of sparkling wit. The prologue rings out mockingly at the "laundered bosoms," "polished salons," and "oily speeches."

The nervous headaches of his university days at length developed into a disease of the spine which resulted in paralysis. This strange man of contradictions, who had been impatient and irritable in health, showed remarkable endurance and cheerfulness in the long years spent on what he termed his "mattress grave." He died and lies buried in Paris.

Heine is perhaps best known to American readers by his poem entitled 'The Lorelei', familiar to us as a German song. The poem suggests that dreamy time just before the approach of twilight. The sunset in a burst of glory lights up the mountain peaks. A boatman is returning home on the Rhine; he looks up and beholds a glorious sight:

> On yonder height there sits
> A maiden wondrous fair,
> Her golden jewels sparkle;
> She combs her golden hair;
> With comb of gold she combs it
> And sings, so plaintively,
> A strain of wondrous beauty,
> A potent melody.

Drawn by the enchanting power of her song, the boatman gazes upward at the beautiful maiden and fails to see the dangerous rocks below. Suddenly there is a crash, and boat and boatman are lost in the waves.

In this story Heine makes use of an old legend which had grown up about a high and dangerous rock on the bank of the Rhine, called the Lorelei or "elf-rock." It is at a narrow part of the river, about 23 miles south of Coblenz, near St. Goar. The rock has a remarkable echo, and it is from this probably that the legend of the enchanting song arose.

Hel'goland. "The Gibraltar of the North Sea" is the phrase which before and during the World War of 1914–18 described this tiny island in the angle formed by the Danish peninsula and the German coast. Immense guns, masked behind powerful fortifications, protected the western entrance to the Kiel canal, as well as the mouths of the Elbe and Weser rivers and the port of Wilhelmshaven. With the batteries only 30 miles away, and the adjacent waters sown with death-dealing mines, these guns established a protective zone behind which the German high-seas fleet long lurked. By the peace terms of 1919 Germany was compelled to dismantle the fortifications which had made the island impregnable. The inhabitants are chiefly Frisian fishermen.

Helgoland (or Heligoland, as it is sometimes called) belonged to Great Britain from 1814 to 1890, when it was ceded to Germany in return for the surrender of certain rights in Africa. In ancient times, when it was a resort of sea-rovers, it was five times larger than the mile length and third of a mile breadth to which the constant pounding of the sea has now reduced it.

Heliotrope. "The flower enamoured of the sun" is what the poet Thomas Moore called the dainty heliotrope, which got its name from the Greek words *helios* (sun) and *trope* (turning) because its one-sided spikes of small fragrant flowers were supposed always to turn toward the sun. In the 18th century a French botanist sent some of its seed from Peru to the royal garden at Paris, where, according to chroniclers, women "welcomed it with enthusiasm, according it their most precious vases, naming it the 'flower of love', and receiving with indifference all bouquets in which their favorite found no place."

Many wild species of these hairy many-branched shrubs are found in the warm and temperate regions of the world, and many cultivated varieties give an added charm to greenhouses and gardens. They grow from one to two feet high, with flowers varying in color from purple to violet and even white. Because of their vanilla-like odor the flowers are used in making perfume and sachet powder.

The heliotrope is a genus (*Heliotropium*) of the borage family (*Boraginaceae*) which has about 220 species in the temperate and warmer parts of both hemispheres. The Peruvian heliotrope (*Heliotropium peruvianum*) is the most common. The lance-shaped leaves are alternate and petioled; the tiny flowers grow in one-sided curved spikes; the calyx is five-parted, the corolla salver-shaped.

Helium. Before scientists knew that the gas helium existed on earth, they had discovered it with the spectroscope on the blazing surface of the sun—hence its name, from the Greek *helios* meaning "sun." Strangely enough, this namesake of the hottest body known to man has since been used to produce the most intense cold ever observed. When helium is turned into a liquid, under immense pressure, and then allowed to evaporate, it generates a temperature of 454 degrees below zero F., only five degrees above the point of absolute zero (*see* Heat).

Helium is the lightest of inert gases—that is, those that refuse to combine chemically with other substances. Because it will not burn it is especially adapted for use in balloons instead of hydrogen, which is highly inflammable. In the World War of 1914–18 the United States attempted to produce this gas in quantities for this purpose. Up to 1915 the world's total output of helium was probably less than 100 cubic feet, and its market value was about $1,700 a cubic foot. Scientists, however, had discovered that helium occurs in some of the natural-gas fields of Kansas, Oklahoma, and Texas, and plants were erected for its extraction. The process consists in refrigerating the natural gas under very high pressure, and then allowing it to expand. As it expands it becomes so cold that all of its constituents become liquid except helium, which is easily separated. Helium can thus be produced for about 10 cents a cubic foot, and quantity production to supply the balloons used on the American front in France had just begun when the fighting ended in 1918.

Helium exists in very small quantities in the atmosphere, in volcanic gases, and in gases from mineral springs. In addition, it is generated by radium, that amazing element which is constantly breaking down and producing other substances; some scientists believe that all the earth's helium has been derived from this source (*see* Radium).

Hemlock. Its plumelike and drooping branches and short flat blunt needles, whitened beneath and appearing two-ranked, afford a sure means of distinguishing this beautiful evergreen tree from its relatives, the pines, the firs, and the spruces. The tiny oval brown cones hanging from the branches are usually only about half an inch long. When the tips of its dark-green sprays are all alight with the yellow-green of the new leaves in spring, the hemlock is one of the most picturesque of American trees.

Hemlocks are tall and pyramidal in shape; they grow to an average height of 60 or 70 feet. With the growing scarcity of pine, the wood has come to be used extensively in interior decoration, although it is soft and warps when exposed to the air. The bark is extensively used in tanning.

There are two chief species: the Canadian hemlock, found in eastern Canada and in the United States as far south as Georgia and as far west as Minnesota; and the western hemlock, found on the Pacific coast and as far east as Montana.

The name "hemlock" is also applied to a family of poisonous plants native to Europe and parts of Asia, and extensively naturalized in North America. It is often mistaken for parsley, which it closely resembles.

THE CANADIAN HEMLOCK



On the right is the trunk of the Canadian Hemlock. On the left are hemlock branches with their short flat blunt needles, their oval cones, their winged seeds that help the Hemlocks to march into new territory, and to climb so high on the mountain sides.

A sure means of distinction is the disagreeable mouse-like odor of the hemlock plant when it is bruised. The Greeks used this poison to kill criminals; the philosopher Socrates was thus executed.

Scientific name of Canadian hemlock, *Tsuga canadensis;* western hemlock, *Tsuga heterophylla.* Bark reddish or gray, becoming furrowed with age. Leaves linear, ½ inch long; growing singly and opposite each other. Cones very small and thin-scaled. Fruit winged seeds.

HEMP. Since very early times the fiber of the hemp plant, a native of temperate Asia, has been employed in making coarse cloth and rope, and today its cultivation is an important industry in China, India, various parts of Europe, and the United States. In India and China hemp is cultivated not only for its fiber, but for its flowers and leaves from which is prepared an intoxicating drug, called "hashish." Russia, Italy, and Austria-Hungary are the chief producers of hemp in Europe; in the United States the largest crops are grown in Kentucky, Wisconsin, California, and South Dakota.

From the close of the Civil War until a few years ago, Kentucky was the only important hemp-producing state. Production remained almost at a standstill and the United States imported about half its supply from Russia and Italy. The crude and primitive methods of harvesting the crop and preparing the fiber required an enormous amount of labor. Everything was done by hand, as is still the practice in Europe. The crop was cut with hand sickles, spread out on the ground to be "retted" by the weather for several weeks, gathered and bound in shocks by hand, and finally crushed in a heavy wooden hand-brake to separate the fiber from the wood of the stem. "Braking" by hand is an especially tedious and laborious task; 100 pounds of cleaned fiber is a good average day's work for a man.

Since 1916, however, production in the United States has grown by leaps and bounds, chiefly as the result of the introduction of machinery. Crops are now harvested by an ingenious machine which spreads the stalks in even swaths. Another machine gathers and binds them when they have been retted. The crushing is done in power-brakes with fluted rollers, and the fiber is removed in a scutching machine.

Hemp fiber, which comes from the inner bark of the stem, is valuable because of its length, toughness, pliability, and resistance to water. American dew-retted fiber is grayish and rather coarse but Italian fiber, which is retted by soaking in soft water, is soft, lustrous, and almost white.

Hemp is chiefly used for making rope, twine, shoe and harness thread, and the coarse cloth known as gunny-sacking. At one time it was used extensively in the manufacture of sail cloth and sheeting, and some of the finer quality is still made into cloth in China and Japan. Hemp seeds produce an oil which is used in the manufacture of soap and varnishes. They are also used for bird-seed.

The term hemp is also used to designate many kinds of fiber in no way related to the hemp plant—among them Manila hemp, sisal hemp, and the Sunn hemp of India. Manila hemp is a product of the Philippines and is obtained from a species of banana plant. Though not so strong as the true hemp, it is noted for its length (six to ten feet), smoothness, glossiness, and softness, which make it ideal for rope-making. Its high price has led to the development of the sisal hemp, a cheaper, shorter, stiffer fiber extracted from henequen, a cactus-like plant of Yucatan, which has come into common use in spite of its inferiority.

All cultivated true hemp is produced from *Cannabis sativa,* an annual herb of the nettle family varying under cultivation from 3 to 16 feet in height and having angular rough stems and alternate deeply lobed leaves. The male and female flowers grow on separate plants, the female plant being taller and more luxuriant and having darker foliage than the male. Manila hemp comes from the *Musa textilis.* (*See* Rope and Twine.)

HARVESTING THE "ROPE" CROP



The hemp harvesting machine cuts an even swath, passes the stalks up to the table on the right of the driver, and from there distributes them over the ground in even windrows. They lie in this way on the ground until they have been "retted," that is, decayed by moisture and exposure so that the woody portions separate from the fiber.



This machine gathers the hemp stalks from the windrows and ties them into bundles ready to be shocked. Notice the shocks already set up in the background.



This complicated gear-driven machine separates the hemp fiber from the woody portion of the stalks. The rollers of the machine are fluted so they will properly crush the stalks as they pass through. Once crushed, the stalks pass on to the "scutcher" which combs out the fiber from the woody pulp.

contained in the Easy Reference Fact-Index at the end of this work

Hennepin, Louis (1640?–1706?). "Anybody but me," boastingly writes Father Hennepin, "would have been very much frightened at the dangers of such a journey as that upon which La Salle now dispatched me." This journey was to be from Fort Crévecoeur, near the present site of Peoria, Ill., down the Illinois River to the Mississippi, and thence up the Father of Waters towards its source.

The man to whom was confided this undertaking was a Franciscan monk from Belgium. He had come to America in 1675 on the same ship that brought La Salle. Love of adventure and religious zeal led him to become a missionary to the Indians, and in 1678 he was overjoyed when he was given permission to accompany La Salle on his great trip of exploration.

Two years later he set out on his dangerous journey from Fort Crèvecoeur. And dangerous it proved, for Father Hennepin and his two companions were captured by the Sioux Indians and carried in canoes up the Mississippi. While in the northern country Hennepin discovered the falls in the Mississippi where Minneapolis now stands. He named them the Falls of St. Anthony, after his patron saint, St. Anthony of Padua.

Soon Hennepin was released by the Sioux, and returned to Quebec and thence to France. There he published his 'Description of Louisiana' on which his fame rightfully rests. Unfortunately, some years later, after the death of La Salle, Hennepin published another book in which he claimed that he also went *down* the Mississippi and discovered its mouth before La Salle made his memorable journey. This falsehood has greatly dimmed the glory which rightfully belongs to Father Hennepin, because for many years people were afraid to trust his first accounts of what he really had done.

Henry, Holy Roman Emperors. Seven rulers of this name are counted in that union of Germany and Italy which is called the Holy Roman Empire (*see* Holy Roman Empire). Henry I, "the Fowler," was king of Germany from 919 to 936, but never concerned himself with Italy and his power even in Germany was weak outside of Saxony. Henry II, called "the Saint" (reigned 1002–1024), was the last of the Saxon house; he made three expeditions into Italy and was an earnest supporter of church reform. Henry III was a member of the Salian line, and in his reign (1039–1056) the kingdom of Burgundy was added to the empire.

Henry IV (reigned 1056–1106) succeeded his father, Henry III, when he was less than six years old. He grew up wilful and headstrong amid bitter contests over the regency. A few years after he took power into his own hands the storm of the Investiture conflict broke and lasted far into the reign of his son. The question was whether the Pope or Emperor—church or state—should control the appointment of bishops and other high clergy, who were not only high officers of the church but great feudal princes exercising power in the state as well.

In 1077 revolts in Germany forced Henry IV to cross the Alps into Italy in the dead of winter, and abase himself before the Pope, Gregory VII, at Canossa. Only after standing three days in the courtyard, fasting and barefoot, was he admitted

THE EMPEROR HUMBLES HIMSELF BEFORE THE POPE



When Emperor Henry IV defied Pope Gregory VII, his people revolted, and he was forced to journey across the Alps in the dead of winter to obtain the Pope's pardon. Here we see him at Canossa, after he had been kept waiting without food for three days, ascending the steps barefooted and in penitent's robe to kneel at Gregory's feet.

and the Pope's excommunication raised, on hard conditions. It was the most brilliant victory that the papacy ever won over the temporal power. It proved, however, to be only an incident in a long struggle which outlasted both Henry and Gregory. (*See* Gregory, Popes).

HENRY V (reigned 1106–1125) joined his father's enemies in 1104, and the elder Henry died in defeat at Liége, in what is now Belgium. The son, when once seated on the throne, became as staunch an upholder of the imperial claims as his father. In the Concordat of Worms (1122) the Investiture conflict was ended by a compromise, which guarded the just rights of both parties. Henry V died without children, and the throne then passed to the Hohenstaufen House.

HENRY VI (reigned 1190–1197) was the third of the Hohenstaufen line, the able son of the great Frederick Barbarossa and the father of Frederick II, "the wonder of the world." (*See* Frederick, Emperors). The chief event of his short reign was his acquisition by marriage of the Norman kingdoms of Sicily and Naples.

HENRY VII (reigned 1309–1313) was the last emperor who sought to obtain the claims and traditions of the medieval Empire. He died in Italy, frustrated in his attempts to restore any effective union of Italy and Germany.

HENRY, KINGS OF ENGLAND. Eight Henrys have sat on the English throne since this name was first introduced into the royal line in the person of Henry I, youngest son of the Norman conqueror; and all except two of these royal Harries (Henry III and Henry VI) were among the ablest sovereigns of that island kingdom. But the disfavor created by the crimes and oppressions of the last of the series—the tyrannical Henry VIII, father of the great Elizabeth—was so great that no English sovereign since his time has borne this formerly popular name.

HENRY I, who reigned 1100–1135, was called "Beauclerc" because, unlike most princes of that age, he was a "good scholar." He is credited with saying that "an unlettered king is only a crowned ass." During the 35 years of his reign England enjoyed peace and prosperity. The chronicler of those times wrote that he "was a good man and great was the awe of him; no man durst ill-treat another in his time."

At his accession Henry I issued a famous "Charter of Liberties" which became the basis of Magna Carta, the foundation of the liberties of the Anglo-Saxon world. He also favored the church in order to win its support against the pretensions of his elder brother Robert, who claimed the English throne in addition to the duchy of Normandy left him by their father. The English were conciliated by his marriage with Matilda, a descendant of the Anglo-Saxon kings. And the support of the common people was assured by his repression of the Norman nobles and by the justice he administered through the "King's Court." The "Lion of Justice," he was called.

One misfortune darkened Henry's later years. His only son was drowned when the *White Ship* sank in the English Channel, and, according to the story, the king "never smiled again." This accident left his daughter Matilda and his nephew Stephen contestants for the throne at his death (*see* Stephen, King of England).

Great Work of the First Plantagenet King

HENRY II, 1154–1189, was the son of Matilda, and the grandson of Henry I. His father was Geoffrey of Anjou, called "Plantagenet" from his habit of wearing a sprig of the broom plant (*planta genista*) in his cap; so with Henry II, in 1154, the first Plantagenet king ascended the English throne. Two years before he became king, as a lad of 18, Henry had led an army from France to assert his mother's claim, and the wearied Stephen had agreed to a treaty by which Henry was recognized as his successor.



HENRY II
The First of the Plantagenet Kings

Henry II was the most powerful prince in Christendom. In addition to England and Normandy which he held by his mother's right, he inherited from his father, as French fiefs, the important counties of Anjou, Maine, and Touraine, and by his marriage with Eleanor of Aquitaine he acquired Poitou, Guianne, and Gascony, so that he held most of the British Isles and about one-half of France. Frequent wars with his suzerain the French king followed, in which his rebellious nobles took unsuccessful part against him.

Henry II re-established law and order after the anarchy of Stephen's reign. He improved the military service by permitting the barons to pay "scutage" or shield money in place of serving in the army; with this he hired soldiers who would fight whenever and wherever he wished—an important means of keeping in order the powerful nobles of the land. But his greatest work was the reform of the law courts. The Curia Regis was brought into every part of England by sending learned judges on circuit through the land to administer the "king's justice," so that gradually one system of law took the place of the many local customs that had been in use. He also established the "grand jury" by which accusations could be brought by a body of representatives of the community against evildoers who were so powerful that no single individual dared accuse them. To him also we owe the growth of the "petty" or "trial jury," especially in cases relating to land; this substituted the weighing of evidence and testimony by

sworn men for the old superstitious trial by battle or by ordeal. Henry even attempted to bring churchmen who committed crimes under the king's courts, but the scandal caused by the murder of Archbishop Thomas Becket in the course of this quarrel forced him to give up this reform (*see* Becket, Thomas).

Henry's last years were embittered by the rebellion of his sons, aided by Philip Augustus of France and by their mother, the unscrupulous Eleanor. The king, old, sick, and discouraged, had to consent to the terms demanded of him. When he saw the name of John, his favorite son, among those of his enemies, he exclaimed, "Now let all things go as they will; I care no more for myself, nor for the world." Two days later he died muttering, "Shame, shame on a conquered king."



HENRY IV
Founder of the House of Lancaster

HENRY III, 1216-1272, son of King John, was a religious man and a good husband and father, but he was a weak and incompetent ruler. Until he became of age officers trained under his grandfather, Henry II, directed affairs, and good order and prosperity prevailed. When Henry III took the administration into his own hands, he squandered the revenues of the kingdom on greedy relatives and favorites. The nobles seized upon his misgovernment as an excuse for rebellion in the Barons' Wars, under the leadership of the patriotic Simon de Montfort (*see* Montfort, Simon de). After Simon was defeated and slain in the battle of Evesham (1265), the people looked to the king's son, Edward I, for good government, and during the last seven years of Henry's reign the country was quiet and prosperous, the king being guided largely by the advice of his gifted son, Prince Edward.

The Lancastrian Henrys

HENRY IV, 1399-1413, founder of the royal House of Lancaster, landed in England from unjust exile with only 60 followers. The 60 soon became 60,000, for all classes of people were tired of the mingled weakness and tyranny of Richard II, grandson and successor of Edward III, and he was now deposed and imprisoned. And Henry IV, claiming descent "by right line of blood from the good King Henry III," was seated on the throne by Parliament. But throughout his reign of 14 years his position was insecure and trying. The claim later asserted by the House of York was felt to be a better hereditary title to the throne than that of Lancaster. Scotland was restless, newly conquered Wales broke into open revolt, and the powerful family of the Percies, to whose aid Henry IV owed much in gaining the throne, took arms under the famous "Hotspur." So Henry perforce was obliged to keep on good terms with the church, and to permit the newly arisen Parliament to exercise powers in the government which became a notable precedent in later struggles between Crown and Parliament. Shakespeare represents him as speaking these words on his death bed to his son and successor, Henry V:

> Heaven knows, my son,
> By what by-paths, and indirect crook'd ways,
> I met this crown; and I myself know well,
> How troublesome it sat upon my head:
> To thee it shall descend with better quiet,
> Better opinion, better confirmation;
> For all the soil of the achievement goes
> With me into the earth. . . .

HENRY V, 1413–1422—the former madcap "Prince Hal" of Falstaff's companionship in Shakespeare's scenes—proved the hero-king of England. As king he "put away childish things," and was sober, clearheaded, and vigorous, so that he acquired the reputation of being "the most virtuous and prudent of all the princes reigning in his time." He followed his father's advice to "busy giddy minds with foreign quarrels" by putting forth again the claim to the French throne, formerly raised by Edward III, thereby renewing the Hundred Years' War (*see* Hundred Years' War). By his brilliant victory at Agincourt (1415) he conquered all the northern half of France, and by a treaty five years later he married Princess Katherine of France, and it was agreed that he should become king of France also after the death of her father, the insane Charles VI. In the midst of his victories, Henry V died of camp fever, leaving as heir to his rights in both kingdoms his infant son Henry, nine months old.

HENRY VI, 1422–1461, was one of the most unfortunate kings who ever sat on a throne. While he was still a baby his uncle, the Duke of Bedford, ruled for him, and for a time maintained and even extended the English conquests on the continent. Then the French were aroused by Joan of Arc, who raised the siege of Orleans and brought the young French king, Charles VII, to Reims to be crowned (*see* Joan of Arc).

Matters did not mend for the English when Henry VI grew to manhood. He was truthful, upright, and just, but he had neither the strength of mind nor of body to rule a kingdom, and for long periods he was insane like his French grandfather. War and business were never to his liking; he would rather have lived the life of a monk. So bit by bit the English lost the lands which they held in France, until only the city of Calais was left to them when the long Hundred Years' War ended, in 1453.

Meantime the misgovernment of Henry's ministers at home led to a rebellion under Jack Cade, in 1450, in which London was taken before the insurgents were overpowered and their leaders executed. Five years later began the bloody and merciless Wars of the Roses. In these Queen Margaret, Henry's French

KING HENRY'S PRAYER BEFORE THE BATTLE OF AGINCOURT.



The bearded warrior in the foreground with his hands folded is Henry V. He has drawn up his small army to receive the blessings of the priests, before giving battle to the French. Men, horses, and the torn flag tell of the hard campaigns they have been through. A few hours after the scene depicted here, the English had gained one of the most brilliant victories in their history, and Henry had made himself master of northern France. This is a reproduction of a famous painting by Sir John Gilbert, which hangs in the art gallery of the Lord Mayor's mansion in London.

wife, was the real head of the Lancastrian party, and King Henry played only a feeble part. But in the course of the contest he lost his throne to the Yorkists, his young son Prince Edward was slain, and the king himself was finally murdered in the Tower of London, where he was imprisoned. (*See* Roses, Wars of the.)

The Founder of the Tudor Line

Henry VII, 1485-1509, who claimed descent from the Lancastrian House, gained the throne by overthrowing the last of the Yorkists. When the battered crown of the usurper Richard III was picked up on Bosworth Field and placed on the head of Henry Tudor, this seventh Henry, the Wars of the Roses ended, and with them the Middle Ages in England. He was the first modern king of that land. He united the houses of Lancaster and York by marrying Elizabeth of York, niece of Richard III. War had no place in the policy of this Tudor king, who was called the "Solomon of England" and was regarded as the craftiest and stingiest prince of his time. Abroad he secured his aims by treaties and by the marriage alliances of his children. At home he increased his power by forbidding the great nobles to maintain lawless bands of followers, and by compelling them to obey the laws by means of his famous Court of Star Chamber (*see* Star Chamber). He thus laid the basis of that powerful Tudor monarchy, as it came to his son Henry VIII, and the great Elizabeth.

Henry VII is also to be remembered because in his time the Renaissance (*see* Renaissance) was established in England. William Caxton had introduced printing into England shortly before this; and it was John Cabot, sailing by permission of Henry VII, who laid the foundation for England's claim to Newfoundland and the mainland of North America.

Henry VIII, 1509–1547, was educated in the New Learning, and—before the death of his elder brother Arthur made him heir to the throne—was intended for the archbishopric of Canterbury. He was a gay and handsome youth, well skilled in all manner of athletic games, though in later life he became coarse, fat, and ungainly. For nearly 40 years he ruled England with a strong hand and brought about one of the most far-reaching changes ever effected in the institutions of any kingdom. For motives of policy

he was betrothed to his brother's girl widow, Catherine of Aragon. During the first 20 years of his reign he left the shaping of policies largely in the hands of his great counselor, Cardinal Wolsey, who sought to give England importance by acting as an arbiter between warring Spain and France. On one occasion Henry took part in France in the gorgeous display of the "Field of the Cloth of Gold," where he and the young French king, Francis I, met to wrestle, dance, watch tournaments, and talk of international relations and policies.



HENRY VIII
England's Royal Bluebeard

At the end of this period Henry professed doubts as to the power of the Pope to grant him the "dispensation" which the laws of the church had required in order that he might marry his brother's widow. Perhaps these doubts were strengthened by the fact that the only one of Queen Catherine's children to live was a sickly girl—the Princess Mary—and it was doubtful whether a woman could succeed to the English throne. Then, too, Henry had grown tired of Catherine and had fallen in love with a young lady of the court named Anne Boleyn.

When the Pope would not annul his marriage, Henry in furious anger turned against his faithful minister Wolsey, deprived him of his office of Chancellor, and had him arrested on a charge of treason (*see* Wolsey, Cardinal). He then obtained a divorce from Thomas Cranmer, whom he appointed Archbishop of Canterbury for the purpose, and it was soon announced that he had married Anne Boleyn. The Pope was thus defied. All ties that bound the English church to Rome were broken. Appeals to the Pope's Court were forbidden; all payments to Rome were stopped; and the Pope's authority in England was abolished. By an act of Parliament, Henry himself was declared "Supreme Head of the Church of England," and to deny this title was made an act of treason. Some changes were also made in the church services, and the Bible translated into English and printed copies placed in the churches. The monasteries throughout England were dissolved and their vast lands and goods turned over to the king, who in turn granted those estates to noblemen who would support his policies. In the northern part of the kingdom the people rose in rebellion in behalf of the monks, but their "Pilgrimage of Grace," as it was called, was put down with bloody cruelty.

Although Henry reformed the government of the church, he refused to allow any changes to be made in its doctrines. Before his divorce he had opposed the teachings of Luther in a book which had gained for him from the Pope the title "Defender of the Faith"—a title the kings of England still bear. And after the separation from Rome he persecuted with equal severity the Catholics who adhered to the government of Rome, and the Protestants who rejected its doctrines.

With equal bloodthirstiness he put to death every possible claimant to his throne. Among other victims whom he sent to the block were two of his wives, for he was married six times. You may perhaps have heard the old jingle:

King Henry the Eighth to six wives was wedded.
One died, one survived,
Two divorced and two beheaded.

Anne Boleyn bore the king one child, the famous Elizabeth; then she lost his regard and was put to death. A few days later Henry married his third wife, Jane Seymour, who died in a little more than a year, after having given birth to the future Edward VI. A marriage was then contracted with a German princess, Anne of Cleves, whom the king had been led to believe to be very beautiful. When he saw her he discovered that he had been tricked; and he promptly divorced this wife and beheaded Thomas Cromwell, the minister who had arranged the marriage. His fifth wife, Catherine Howard, was sent to the block for misconduct. But the sixth one, tactful Catherine Parr, managed to survive this royal Bluebeard and lived to marry her fourth husband.

Henry, Kings of France. Four kings of France have borne the name of Henry, of whom the last was the greatest. Henry I, who ruled 1031–1060, was a contemporary of William the Conqueror, of England, and was defeated by that invincible warrior when he attempted to assert his authority over the duchy of Normandy. Under Henry II (1547–1559) began the religious persecution of the Huguenots, which laid the fuse for the religious wars after his death. He died in a tournament, when a splinter from a lance entered the eye-hole of his helmet and penetrated to his brain; in this, Protestants saw the hand of Providence. The utterly worthless Henry III (1547–1589), the last of the three weak sons of Henry II and Catherine de Medici, was for a brief period

elective king of Poland before he succeeded to the throne of France. His death by an assassin's hand, in the course of the Huguenot wars, opened the succession to his Protestant rival, Henry of Navarre.

HENRY IV, king of France and Navarre, who reigned from 1589 to 1610, was the last and greatest of the Henrys. He was king not only of France but also of the small independent kingdom of Navarre, on the northern slope of the Pyrenees. In 1569, when he was 16 years old, his mother, Jeanne d'Albret, the Huguenot queen of Navarre, placed him in the care of Admiral Coligny, the brave Huguenot leader (*see* Coligny, Gaspard de). From that time until his accession as king of France, Henry of Navarre was the recognized leader of the Huguenot party; but, for a short time after his marriage to the king's sister, Margaret of Valois, and the subsequent massacre of St. Bartholomew's Day, he seemed to renounce the Protestant faith in his tolerant easy-going way.



HENRY IV

"Now glory to the Lord of Hosts, from whom all glories are! And glory to our Sovereign Liege, King Henry of Navarre!"

At the death of Henry III, in 1589, Henry of Navarre was the heir to the throne of France. But his right of succession was disputed by the powerful Catholic League, aided by the king of Spain, and he was not crowned until he had enforced his claim by arms and had become a member of the Catholic church. The victory was practically won at the battle of Ivry, in 1590, which Macaulay has rendered famous by his poem of that name, beginning—

Now glory to the Lord of Hosts, from whom all glories are!
And glory to our Sovereign Liege, King Henry of Navarre!

Henry IV also set about restoring the prosperity of the land. "My wish," he said, "is that every peasant in the kingdom should be able to have a chicken in the pot for his Sunday dinner." Agriculture and manufacture were encouraged by him, and roads repaired so that commerce might be benefited.

The improvement in the condition of the people, in which he was aided by his great minister the Duke of Sully, and the agreeable personality of Henry IV, the first of the Bourbon kings, combined to render him the most popular king France has ever had. He was struck down by the dagger of a religious assassin, as he was riding through the streets of Paris, leaving the throne to his young son, Louis XIII.

Although he conformed to the Catholic church, Henry IV did not forget the claims of his former religious associates. The Edict of Nantes, which he issued in 1598, gave the Huguenots equal political rights with Catholics; the right to reside freely anywhere in France; freedom of private worship in their own homes, and public worship in certain places (not including the king's court or within five leagues of Paris); and the government of La Rochelle and a few other strong places as "cities of refuge." This edict remained in force, with some modifications, for nearly a hundred years (*see* Louis, Kings of France).

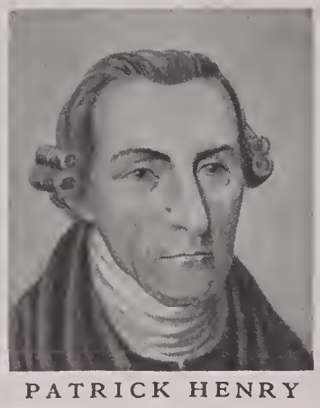
HENRY, PATRICK (1736–1799). The stirring words of Patrick Henry, "Give me liberty, or give me death," furnish the keynote of that famous orator's public career. As an agitator and a champion of the common people he had no equal in his day.

Patrick Henry was born in east-central Virginia, of good Scottish stock, and received such education as the scanty opportunities of that vicinity permitted. But he was a venturesome and fun-loving youth, and gave up his studies at the age of 15 to enter business. Three times within the next seven years he failed—twice as storekeeper, and once as a farmer. Convinced that he had no ability in either of these fields, he next turned his attention to law. Here he found a congenial pursuit, for he was a born talker. After a few weeks of study, he was admitted to the bar. He succeeded immediately as a pleader before frontier juries, and his accounts show that during the first three years of practice he collected fees in 1,185 cases.

In 1763 Patrick Henry supported the people against the established church in a case known as the "Parson's Cause." During the trial of the case he declared in an impassioned speech that a king by vetoing salutary acts of a colonial legislature "degenerates into a tyrant and forfeits all right to his subjects' obedience." This declaration brought him the love of the colonists, and a seat in the Virginia House of Burgesses, just at the time of the passage of the Stamp Act in 1765.

When the older members of that House hesitated, not knowing what course to take in regard to the Stamp Act, Patrick Henry brought in a series of

resolutions, declaring that the English Parliament had no right to tax the American colonies. In the debate which followed, Henry exclaimed with terrifying boldness: "Caesar had his Brutus; Charles the First, his Cromwell; and George the Third . . . " Here he was interrupted by loud cries of "Treason! Treason!" from members of the House. Pausing for a moment Henry coolly added: "And George the Third may profit by their example. If *this* be treason make the most of it!" This fiery speech secured the adoption of the resolutions. By his fearlessness and his eloquence Patrick Henry had become the spokesman for the colonial cause in the southern colonies, as James Otis and Samuel Adams were in New England.



PATRICK HENRY
The Orator of the Revolution

In 1774 Henry was sent by Virginia as a member of the first Continental Congress, where he declared in ringing tones, "I am not a Virginian, but an *American!*" Next year at the second revolutionary "convention" called in Virginia, he made his most frequently quoted speech, in urging the colony to arm her militia:

"Gentlemen may cry peace! peace!" he said, "but there *is* no peace! The war is actually begun! The next gale that sweeps from the North will bring to our ears the clash of resounding arms! Our brethren are already in the field. Is life so dear, or peace so sweet as to be purchased at the price of chains and slavery? Forbid it, Almighty God! I know not what course others may take; but as for me, give me liberty, or give me death."

No one contributed more to arouse the people of Virginia, and a few months later Henry was appointed commander-in-chief of the Virginia troops. He soon quarreled, however, with the Committee of Public Safety, which acted as the governing body of the colony, and resigned his commission. This was perhaps fortunate, for Henry had greater talents as an agitator than as a military leader.

Patrick Henry also aided in drawing up Virginia's state constitution in 1776, and was elected first governor of the state. He filled this post moderately well and was three times reëlected. It was with a commission from Governor Henry that George Rogers Clark set out to conquer the territory northwest of the Ohio from the British.

Henry Opposes the Constitution

In the Virginia convention of 1788, called to ratify the new constitution of the United States, Patrick Henry bitterly opposed the adoption of the new form of government, which he believed was dangerous to the liberties of the country. He objected to it because it contained no "bill of rights," because it infringed too much on the rights of the States, and because (as he said) it would prove "one great consolidated national government of the people of all the States," instead of a mere confederation. And he asked, "Who authorized them (the framers) to speak the language, *we the people,* instead of, *we the States?*" Fortunately Henry's advice to reject the Constitution was overruled by the wiser counsels of Washington and Madison; but as a result of such opposition the first ten amendments to the Constitution were adopted, known as the "bill of rights."

Henry refused all offices under the new government. In 1799, however, he consented to serve again in the Virginia legislative assembly, but he died before he could take his seat. Long before that event he had become reconciled to the Federal Constitution whose adoption he had so bitterly opposed.

Henry the Navigator (1394–1460). "It is said, Sire," remonstrated the sailor, "that he who crosses the Sea of Darkness will be changed into a black—God's vengeance on his insolent prying; that he will reach the Devil's ocean that boils day and night with fiery heat; and that he will find its hellish coasts fringed with sea monsters, serpent rocks, water-unicorns, and other fearsome creatures!"

Prince Henry of Portugal, that munificent patron of voyagers and explorers and one of the heroes of modern discovery, laughed at his captain's fears. "The sea is as easy to sail in as the waters at home," he told him, "and the land very rich and pleasant. Heed not these idle tales; for, by God's help, fame and profit must come from your voyage, if you will but persevere."

Prince Henry did more than any other single person to make the 15th, 16th, and 17th centuries the great Age of Discovery. For 50 years he kept encouraging his countrymen to sail down the west coast of Africa, so that before his death they had pierced through into the unknown South for nearly 2,000 miles.

A Man of Amazing Energy

Henry the Navigator, as he is called in honor of the discoveries he inspired, was the fifth son of John I, king of Portugal, and of Philippa, daughter of the English John of Gaunt. He early distinguished himself at the conquest of Ceuta, the "African Gibraltar," in 1415. Soon afterwards he moved to Sagres, a town close to Cape St. Vincent, where he resided for a great part of his life. While warring against the Moors of Africa, he became greatly interested in this mighty continent, and longed for a better knowledge of the western ocean and the discovery of unknown regions. He founded an observatory and also a school where young men could learn navigation. Then he began sending out expeditions. One by one the rich islands of the Azores, Madeira, the Canaries, and Cape Verde were discovered, and the African coast was explored as far as Sierra Leone. "Explore, trade, convert!" said Prince Henry to his men. All this they did, and—less happily—began trading in captured African slaves.

Prince Henry died before the full results of his work were seen. These results, which made people at last realize that the oceans were not great lakes in a world of land, were credited to others. But the real master of the bold sailors who discovered America, rounded the Cape of Good Hope, reached India, and finally encircled the globe was Henry the Navigator.

HEPAT'ICA. Sometimes while wandering among the woods and hills in early spring you come upon little clumps of delicately tinted flowers in fuzzy coats, which raise their lovely heads through the old dead forest leaves, like the dainty faces of a bevy of patrician ladies muffled in their furs. These are the hepaticas. What charm they have, these little blossoms of blue, lavender, pink, or white—no two clusters alike in shade or size! Even the gift of fragrance is not entirely denied them, but, in the language of John Burroughs, "seems as capricious as the gift of genius in families." Sheltered from the frost by their rusty evergreen leaves, and warmed by the late winter sunshine, they bloom even under the snow itself, on shaded hillside or in woodland dell. And then, after the blossoms, come the new green leaves —rounded, leathery, and glossy green, sometimes mottled with purple—to replace the last year's weather-worn foliage. There are many spring blossoms to follow, but none is fairer than this brave little wilding of the Crowfoot family that heralds the spring from Nova Scotia to Florida and westward to Manitoba, Iowa, and Missouri.

Seientific name, *Hepatica triloba*. The flowers, growing singly on slender stems, are about three-quarters of an ineh broad and have 6 to 12 petal-like sepals enclosed in three fuzzy reddish-green leaflets. In the center are numerous pistils and anther-bearing stamens. There is no eorolla, the sepals taking the plaee of ordinary petals. The slender, hairy stems, springing from the roots, are from 4 to 6 ineches tall, and each bears a flower or leaf. The 3-lobed evergreen leaves are thiek and liver-shaped, whenee the name "hepatica" (from the Greek, meaning "liver").

HEPHAESTUS (*hē-fĕs'tŭs*). The lame god Hephaestus (Roman Vulcanus), the son of Zeus and Hera, was the god of fire and the forge. He was lame from birth, according to some stories; but others assert that he was crippled by being hurled down to earth by Zeus, falling on the island of Lemnos, where he built a palace, with a workshop and anvil. He also had a beautiful palace in Olympus, or, according to others, under Mount Aetna, on the island of Sicily. Here with the help of the Cyclops, the one-eyed giants, he made the thunderbolts of Zeus, the armor of Achilles, and the weapons of Hercules. He was also aided by handmaidens whom he had made of gold and endowed with life. All the palaces of Olympus were built by him. In the Homeric poems the kind hearted but limping god is represented as a comic figure whose deformity provokes "inextinguishable laughter" in the other gods. He was the patron deity of the metal-workers.

HERA (*hē'rȧ*). By the side of Zeus on Mount Olympus, as the Greeks believed, reigned his stately wife Hera (called by the Romans Juno), queen of the gods. Their life was not always one of harmony, however, for Hera was quick to anger and Zeus frequently gave cause for jealousy. Hera was the goddess of womanhood, of marriage, and of maternity. The peacock, the cuckoo, and the pomegranate were sacred to her. She was usually represented as a beautiful majestic woman of mature age, with large wide-open eyes and grave expression inspiring reverence. Homer speaks of her as the "white-armed goddess" and the "ox-eyed queen." The most famous statue of Hera was the one by Polyclitus in the temple at Argos. This was a colossal image, in ivory and gold, representing the goddess seated on her throne, wearing a crown and bearing in one hand a pomegranate and in the other a scepter with a cuckoo at the top.

HERALDRY. In the Middle Ages, when knights wore armor that completely covered their heads and bodies, there grew up the custom of emblazoning devices on shields and surcoats so that the wearers could be distinguished. By slow degrees an elaborate science of heraldry developed. Strict rules were laid down regulating the assumption and design of armorial bearings, and colleges of heralds were founded to enforce observance of the rules. Most of the terms used in heraldry are French, because that language prevailed while the science was growing up.

Several coats of arms are often arranged or "marshalled" on the same shield or "escutcheon" to show descent, marriage, alliance, etc. To enable this to be done the shield is divided into halves by a single line extending across it vertically, diagonally, or horizontally; or it is divided into "quarters" by a cross-shaped arrangement of lines, and these quarters may be further subdivided. The colors or "tinctures" are called *or* (gold), *argent* (silver), *gules* (red), *azure* (blue), *sable* (black), *vert* (green), and *purpure* (purple).

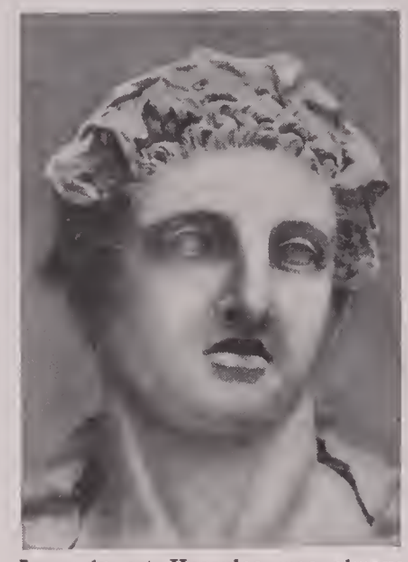
The "charges" or devices are of infinite variety. Some are wide bands, variously named according to the direction in which they cross the shield. Thus the "pale" extends from top to bottom, the "fess" is a horizontal band in the middle, and the "bend" crosses diagonally from the upper left-hand corner (*dexter chief*) to the lower right-hand corner (*sinister base*). The "bend sinister," crossing from upper right to lower left, is popularly but erroneously considered a mark of illegitimacy. Other common charges are simple geometrical designs, and others are conventionalized representations of animals, flowers, trees, leaves, etc. The animal most frequently used is the lion, which may have several positions: *rampant* (erect on the hind legs), *passant* (walking), *couchant* (lying with the head raised), *dormant* (asleep), etc.

Heraldry gets its name from the heralds of the Middle Ages, who were the official representatives of kings and lords. The heralds were also the court chroniclers, and it was their duty to keep track of family relationships and of the intricate etiquette governing coats-of-arms.

Some ADVENTURES *of the Great* HERCULES

The Many Valiant Exploits of the Mightiest of Greek Heroes—How He Chose Virtue for His Guide, and Performed Deeds of Superhuman Daring

HERCULES (*hĕr'kiu-lēz*). The most celebrated of all the Greek heroes was the mighty and great-hearted Hercules (or Heracles as the Greeks called him), the son of the great god Zeus and the mortal Alcmene. The goddess Hera (Juno) was hostile to Hercules from his birth, and sent two serpents to destroy him in his cradle, but the infant strangled them with his hands. He was trained in manly accomplishments by the famous centaur Chiron and other heroes of renown.



In early art Hercules was always shown bearded, but later sometimes youthful and beardless.

When Hercules reached young manhood, so the story goes, two beautiful maidens appeared to him, Arete (virtue) and Kakia (vice). Kakia offered him a life of ease, pleasure, and riches, if he would follow her; Arete said that if he chose her, he must live a life of poverty and hardship, and spend his days in continual struggle against evil. Hercules chose to be guided by Arete in the hard path she pointed out to him.

In a fit of frenzy sent by Hera he slew his own children, and to atone he was forced to serve his cousin King Eurystheus, who compelled him to perform the great tasks known as the "twelve labors."

The first labor was the slaying of the Nemean lion, a monstrous beast that terrified the country of Nemea. Hercules strangled the animal with his own hands; and ever afterwards wore the lion's skin. Next he slew the Hydra, a terrible nine-headed water serpent. As soon as he crushed one of the monster's heads with his club, two more grew in its place, but finally with the help of a friend, who seared each neck with a blazing branch, Hercules succeeded in killing the Hydra. He then dipped his arrows in the poison of the serpent.

His third task was to capture and bring alive to Eurystheus the Cerynean stag, an animal with golden horns and brazen hoofs, so fleet of foot that it scarcely touched the ground. The capture of the wild Erymanthian boar was the fourth labor. A greater task was the fifth, the cleansing of the Augean stables. Augeas, king of Elis, had a herd of 3,000 oxen, whose stalls had not been cleansed for 30 years. By turning the rivers Alpheus and Peneus through the stables, Hercules finished the work in a single day.

As the sixth and seventh labors, he killed with his poisoned arrows the Stymphalian birds, which fed on human flesh, and captured the Cretan bull. This bull had been sent by Poseidon (Neptune) for Minos, king of Crete, to sacrifice. But Minos was so pleased with the beauty of the animal that he kept it for his own; whereupon Poseidon drove the bull mad and it caused great damage. Next came the capture of the horses of Diomedes, the Thracian king. These were wild mares to whom Diomedes fed the flesh of all strangers. Hercules killed Diomedes and threw his body to the horses, before bringing them to Eurystheus.

Hercules was then dispatched to obtain the beautiful girdle of Hippolyta, queen of the Amazons. Single-handed, the hero defeated the warrior-women, killed the queen, and escaped with the girdle. The tenth labor was the capture of the oxen of Geryon, a monster with three bodies, who dwelt on the fabulous island of Erythia, beyond the straits of Gibraltar. On his journey the hero erected the famous rocks on either side of the strait, known as the "Pillars of Hercules."

The eleventh exploit was to obtain the golden apples of the Hesperides, which Gaea, or Mother Earth, had presented to the goddess Hera as a wedding gift. Hercules succeeded through the help of the Titan Atlas, father of the Hesperides, the four sister-nymphs who guarded the apples with the help of a sleepless dragon. Atlas, whose task it was to support the weight of the heavens on his shoulders, went to get the apples, while Hercules relieved him of his burden. While engaged in this labor, the hero encountered some other strange adventures, for on the way he met the tiny race of men called Pygmies and slew the giant Antaeus, son of Poseidon and Gaea, who compelled all strangers coming into his country to wrestle with him, on condition that if he conquered they would suffer death.

The last labor was bringing Cerberus up from the lower world. Braving the dread regions of Hades, he captured this many-headed dog, who guarded the entrance, and brought him before Eurystheus, who was so terrified that Hercules had to take back the monster to the realm of the dead.

Having finished his appointed tasks, Hercules was now freed from bondage. But these were not the only feats of strength and valor he performed. He gave way to violence at times, and once, in a fit of rage, slew his friend Iphitus, but for the most part his strength was used to relieve those who suffered pain or oppression. He delivered Prometheus, who for ages had been chained to Mount Caucasus. He brought back from the grave the noble Alcestis, who had given her life for her husband.

For any subject not found in its alphabetical place see information

As the life of Hercules was a hard one, so also was the manner of his death. With his wife Dejanira he came to the bank of a river across which travelers were carried by the centaur Nessus. Hercules waded across the stream, while Nessus carried Dejanira. But when the centaur attempted to run away with Dejanira, Hercules shot him with one of the poisoned arrows. The dying Nessus called to Dejanira to take some of his blood and keep it as a charm to preserve the love of her husband. Before long, Dejanira, hearing that Hercules was in love with another maiden, sent him a robe which she had steeped in the blood of Nessus. No sooner had he put on the robe than poison spread through his body like fire and caused him such agony that fleeing to Mount Oeta he built a funeral pyre on which he threw himself to die. But as the flames consumed his body, Zeus caught up the immortal part and bore it to Mount Olympus, where, purged of mortal sin and sorrow, Hercules dwelt among the gods in eternal happiness.

Hercules has been a favorite character in literature and his heroic strength has inspired many beautiful works of art. The finest representation of the hero in sculpture is the so-called Farnese Hercules, now in the Naples Museum. This is a copy of an earlier work by the ancient sculptor Lysippus.

LIFE'S LAWS *of* INHERITANCE, *from* PLANTS *to* MAN

The Amazing Laws Discovered by a German Monk, and How They Work—The Mysterious Chromatin that Carries All Heredity, One Ounce Enough for Millions of Offspring—How "Environment" Modifies Heredity

HEREDITY. The saying, "Like begets like,"—each kind of living thing "after its own kind"—expresses essentially the general fact of heredity, the universal law among all kinds of living things, both animals and plants. That it is so is a matter of observation in thousands of times and places, by anyone with sharp eyes, keen wits, and a mind open to the amazing things found in all of the common forms of life. An acorn grows into the giant oak, and not into the peach tree; and a hen's egg hatches into a chick with its many peculiarities, and not into a duckling.

But it is the outside or superficial things that most of us see, and we are apt to forget the vast multitude of more deep-seated resemblances between parent and offspring, many of them on the inside of an animal like man. The parents are tall, have dark hair, and dark eyes; the child will likely be tall, have dark hair, and dark eyes. But think a moment of the deeper things. The parents have three-jointed fingers and toes, eyelids, valves in the heart, many muscles and bones in nice order, many nerves always supplying the same parts of the body—and a thousand and one other things. So the child gets all these in proper form from his parents—always a miracle, and almost always unthought of! It is only when the child is not quite normal that people are apt to think of the unusual thing, when all the while the usual thing is the really more wonderful. How amazingly delicate and minute inheritance is may be observed by anyone among almost any kind of pure-bred domestic animals or plants, or almost any kind of animals or plants in Nature. And yet it remains true that we should really say that "like begets *almost* like"; for the likeness of parent to offspring is never complete.

The resemblance of child to parents is not limited to the structures of the body. The parent is keen, aggressive, resourceful, has a good memory—a thousand and one other things that make for "personality." So the child gets an amazing lot of things from its parentage. In many cases, of course, it is matter of common observation that the resemblance has come from the grandparents, or even more remote ancestors. In such cases, naturally, the traits have lain dormant in one or more generations. Francis Galton, the great English student of many human phenomena, stated this fact in the general law that children resemble their parents about half; grandparents about a quarter; great-grandparents about an eighth, etc. In recent years the tendency has been to place the proportion derived from the parents at a somewhat higher figure.

Let us now examine into the why and wherefore of heredity. It is evident, of course, that any new animal or plant is the product of its two parents, whom it resembles in ways so manifold and so intimate. It must further be clear that the two cells that unite to form the new animal or plant are alone the bearers of the heredity. When the very tiny pollen cell of a plant drops upon a flower, and grows down and unites with the tiny egg in the flower, there is started a new life—let us say of a bean plant. But the same is true for any kind of common animal or plant. It is always the union of an egg cell, and a very small cell from the male animal or plant, that starts the new life. Further, the biologist looks upon the granular material of the nucleus of the two cells as the carrier of heredity from parent to offspring, and this material he calls the *chromatin*. It is about the most wonderful and mysterious kind of material in the world. The most amazing thing about it is the unbelievably small amount of it that can carry all of the things from parent to offspring.

Let us glance for a moment at the four figures in the picture on page 1643. The large white segment in each section of the picture is a portion of the egg cell, much magnified, for the egg of most animals and plants is very small and requires the microscope for examination. Let us suppose it is the egg of a star-

fish or of an angleworm, both of which eggs are invisible to the unaided eye. Inside the egg, which is here represented as transparent, you see two round objects containing dark threads and black dots. The round object on the right of the first section is the "pronucleus" of the egg, the dark threads are the female "chromatin," and the black dot is the female "centrosome." The round object on the left is the "pronucleus" brought into the egg by the male cell. It contains male "chromatin" and a male "centrosome." Now, it is most important to see that the two circles—the two nuclei from the two parents—are of the same size, and the amount of matter in the chromatin threads the same, for that is the reason an animal or plant may resemble its two parents equally.

In the succeeding figures the two bodies are approaching nearer and nearer, till in the fourth they have united and the rods are ready to divide in the formation of the two first cells.

Heredity Hidden in the Multiplying Cells

Look at this picture carefully, for it contains all that is to grow and develop into a new animal, the most wonderful process that takes place in animal or plant life. Now this fertilized egg cell is to divide into two; these each into two; and so on—many, many times—till the body of the new animal or plant is composed of its millions of cells of many kinds. Further, into each of the cells has gone some of the wonderful chromatin, half from each parent. And such a very tiny bit of it in each of the fertilized eggs that is to give rise to the new animal or plant! An ounce of it for any kind of animal or plant would carry the heredity for millions of new offspring.

What a miracle! What wonder that the student of Nature is all enthusiasm about his studies! He sees every day enough wonders and mysteries to stir his imagination for a lifetime. Think of the coming into being of a chick! We all know that, when heat and other favoring conditions have been supplied, the egg has changed into a pulsating living thing, with all its wonderful systems that make it a perfect animal, able to live its own life. And so it is for all of the many forms of life about us. And yet most of us pass through life, not seeing and not contemplating some of the most wonderful things the world contains —things about us every day.

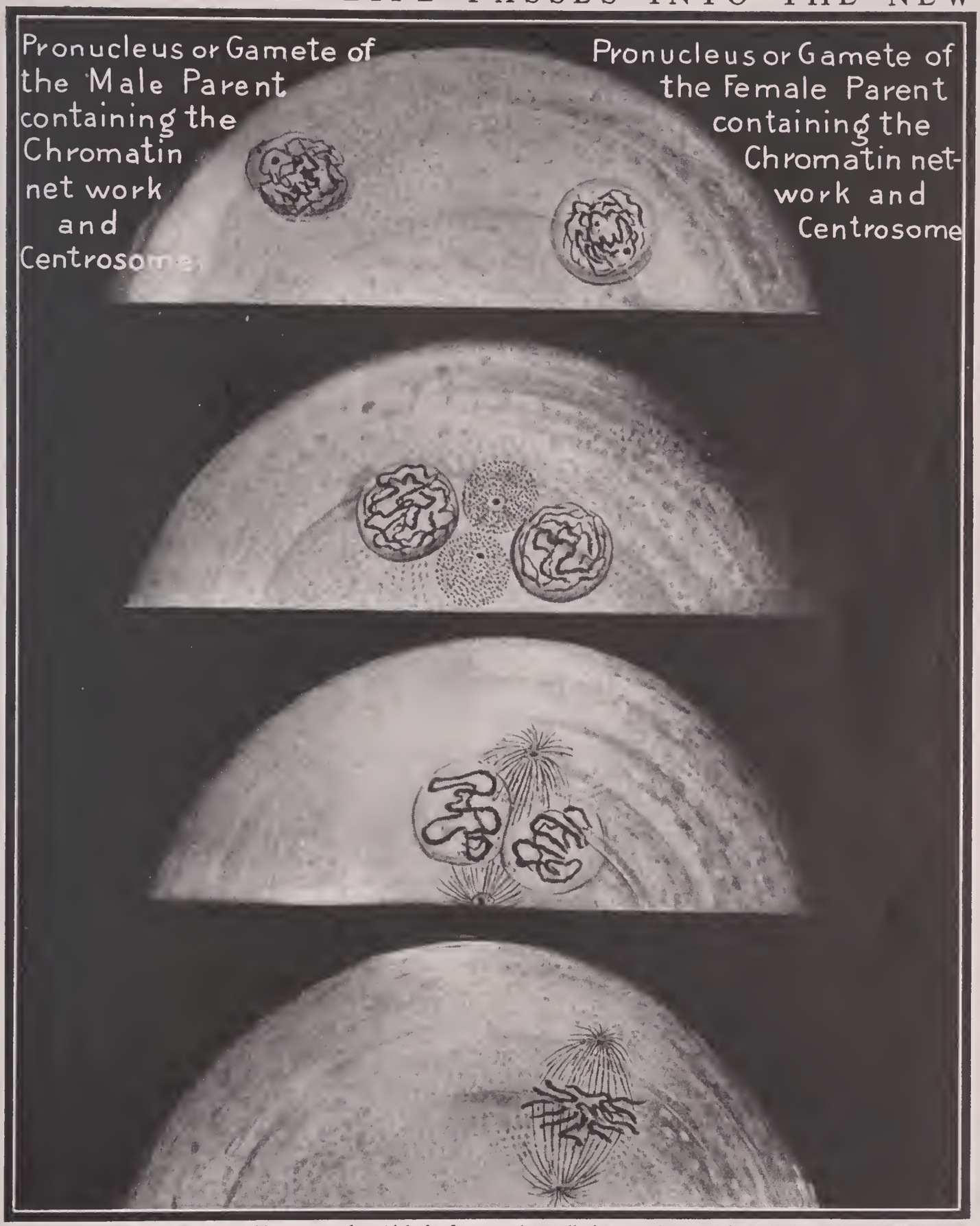
Now let us go a little further. It must be clear to all, of course, that law and order are universal in Nature, and so there must be "laws" of heredity—laws that govern the inheritance of children from parents. It must be confessed that most of the laws of heredity remain to be discovered; yet much is known, discovered almost wholly in very recent years, and scientists believe much more will be known shortly. But such studies are among the most difficult in all the realms of science, and it may be many years before all has been made clear.

The outstanding worker in studies in heredity was an Austrian monk, Gregor Mendel (1822–1884), who published his discoveries in 1866, although the importance of his work was not recognized till 1900. He worked especially with peas, and the amazing thing is that his laws have been found to apply to many things, in many kinds of animals and plants. Think of it, the same *laws* for inheritance of many things in an animal, such as a guinea-pig, as for a plant like a pea! Let us illustrate by guinea-pigs. If the two parents be from pure strains, *black* and *white*, the children will be, not *gray* as might be expected, but *all black* in the first generation—all *apparently* pure black! But in the next generation there comes out one-fourth of the children pure *white* again, one-fourth pure *black*, and a half apparently pure black, but really *mixed* again. The pure whites and blacks will breed true, but the mixed ones will yield children of which a quarter are pure white, another quarter pure black, and half mixed. And so on, indefinitely. You see, in the apparently black there is hidden the white, to come out pure again in a quarter of the children of the next generation. In this case, where the black temporarily hides the white, the black is said to be "dominant" over the white. In some cases—"four-o'clocks" among plants, for instance—the children will be half-way between the two parents, and crosses of *reds* and *whites* will yield *pink* flowers in the first generation. But in the next there emerge a quarter pure red, another quarter pure white, and half pink. The whites are pure, so are the reds; but the pinks are mixed, and will behave exactly as in the color of the guinea-pigs—only one color is not "dominant" in this case.

Only a very few of the many illustrations of Mendel's law can be cited, and it must be remembered all the while that it is a matter of experiment in all cases to find out whether for any feature of any animal or plant it will follow Mendel's law. The following are among the most interesting: In rabbits and guinea-pigs, black is dominant over white, and short hair is dominant over long hair. Among cattle, hornless character of the "muley" is dominant over horned, short legs over long legs. In horses, bay is dominant over black or chestnut, and gray over all other colors, and pacing over trotting. In pigs, pure white is dominant over color, and black over red. In dogs, gray is dominant over black, and any pure color over mixed colors, like black-and-tan. These are but a few of the illustrations for a few animals; hundreds of others might be cited. It should be said, too, that some of the laws that have been discovered are much too intricate to give here. But enough is known to show that much advantage may be derived in future by applying the *laws of heredity* in improving many of man's domestic animals and plants.

Mendel's Law Applied to Man

What do we know of the laws of heredity as applied to *man?* Things we inherit fall under several types, and the following is the classification given by Professor Castle. In matters of stature, size of body, skin-color, shape of head and its features, children are apt to be intermediate between father and



This picture represents the astonishing process by which the first complete cell of a new plant or animal life is produced. At the top we see a segment of the egg, with the female "pronucleus" at the right. The male "pronucleus" at the left has just made its way into the egg and is approaching the female. Notice the black dot in each "pronucleus"—those are the energy centers called "centrosomes." In the next section, the male and the female "pronuclei" have drawn close together and the two "centrosomes" have come out and arranged themselves in the space between the pronuclei. In the third section, the "centrosomes" have developed radiating threads, forcing the nuclei together. Finally, at the bottom, the male and female elements have merged into one group. At this instant a new life begins. The chromatin from each "pronucleus" has arranged itself into a central mass, which is composed of exactly equal parts of male and female substance. The new cell will now begin to grow as a separate life unit, inheriting its vital germs from both father and mother cells. How this new cell now proceeds to split up and form other new cells is explained in the picture on page 395, with the article on Biology.

mother. The following illustrate Mendel's law: Dark eyes dominate over light eyes; two-jointed fingers over normal three-jointed; brittle bones (of some people) over normal bones; normal eyes over color-blindness and over night-blindness; normal minds over feeble-minded. And so for other things. But it should be said that most human characteristics have not yet been shown to follow Mendel's law. The following are clearly hereditary, but how exact are the laws followed is not now certain: defective teeth and hair, hare-lip, tendency to twins, left-handedness, some forms of deafness. The following are subject to heredity, but to what extent and how they are inherited is not known: general mental ability, ability for art, music, mathematics, defective heart, some forms of epilepsy and insanity, longevity, and many other things. There is often a wrong impression that diseases are inherited. It is true that a *tendency* to some diseases may run in a family, just as in other families there is a natural immunity from some diseases. But a disease itself is not inherited. Tuberculosis is a disease due to tubercle germs. A child may be born with a constitutional tendency to the disease, but the germs come in after birth, with the food, water, or air.

The relative importance of heredity and environment in a human life is a question as old as the ages—a question never possible of a very accurate solution. Of course, it is clear to anyone that life is a very intricate fabric, in which the "warp" is supplied by heredity, and the "woof" by the things that come into one's life, mostly after birth. All these things that come in after birth make up what is usually called the "environment"—the food we eat, the air we breathe, the water we drink; still more important, the surroundings that make for moral and mental and spiritual welfare or disaster—the millions of things that come into all lives—these all together make up the "environment." And what of the relative importance of the multitude of things we bring into the world, and the infinitude of things the world gives us—even thrusts upon us?

How Much Do We Owe to Heredity?

On the one hand are those who maintain that a person is so strongly stamped by heredity—the things he brings into the world with him—that whatever he is and does in life is almost wholly the result of his inheritance. On the other side are those who maintain that the child at birth is so plastic that there are practically no limitations upon the possibilities; that, with proper surroundings and education, all for good is possible; with untoward surroundings, all for bad.

The truth certainly lies somewhere between the two extremes. Certainly the main qualities are stamped by heredity—stature, "stamina," tendency to good health, general ability, temperament—or the reverse of all these. But the outlet for any personality is most certainly dependent on its surroundings; and what a person becomes will much depend on his place and mode of life, his education, friends, all of the infinitude of things that make up his "environment." Just as there are sandy, sterile soils, and very fertile soils, and all grades between, so there are defective minds (the feeble-minded) and geniuses, and all grades between. And just as there are sterile soils for which cultivation will do nothing, while it will help much the other soils, so there are the helpless minds, for whom education and other forms of help avail little or nothing; while they avail much for the average mind, and most of all for the superior mind.

The weak person is always weak, whatever the surroundings; the person of average native ability and personality will be very much what his surroundings make him; while the strong person will be strong in any place or station in life. The particular form which his strength will take will depend on time and place. George Washington would have been great in any place and time, but he would not have been the "Father of his Country" had there been no Revolutionary War. Thomas Edison would have been strong anywhere and in any place; he became a great inventor because he lived in America at a time when the world of science and industry about him made his discoveries possible. So, we may conclude that the person of average native ability will still be average in almost any time and place, while a great career is a combination of great native ability, character, and personality, with great opportunity.

HER'MES. "A schemer subtle beyond all belief" was the Greek god Hermes, also called Mercurius (Mercury) by the Romans. He was the son of Zeus and Maia, daughter of Atlas. He began his career by escaping from his cradle, when a few hours old, and going out in search of adventures. Finding a tortoise, he took the shell and stretched cords across it, thus inventing the lyre. That same evening he stole the oxen of Apollo, god of the sun, hid them in a cave, and killed two of the oxen. When Apollo discovered the theft, Hermes so charmed him by playing on the lyre that he allowed the little rogue to go unpunished. Hermes gave his lyre to Apollo and received in return a magic wand, called the *caduceus*, which bestowed wealth and prosperity and turned everything it touched into gold.

Hermes was made the messenger of the gods, and in this capacity one of his many duties was to conduct the shades of the dead to the lower world. Among men he became the patron of merchants, the god of eloquence, of good fortune, of prudence and cunning, of fraud and theft. He was also regarded as the god of the roads and the protector of travelers. Pillars with his image at the top were erected as guideposts.

Hermes was represented most commonly as a slender youth, wearing a broad-brimmed hat adorned with two small wings, and carrying the caduceus in his hand. On his sandals were wings that bore him over land and sea with the swiftness of the wind. Of the statues that have come down to us from antiquity, the most famous is that by Praxiteles, representing Hermes carrying the infant Dionysus.

HERO AND LEANDER. The imperishable story of Hero, priestess of Aphrodite, and Leander, the stalwart lover who nightly swam the Hellespont to meet her, stands in literature as one of the supreme examples of ill-fated love. According to the story as told by various Greek and Roman poets (notably Musaeus in the 5th or 6th century A.D.) Hero used to place a lamp at the top of her lonely tower at Sestos each night to guide her lover in his struggle with the waves from Abydos on the other side of the strait. Venturing to make the passage one stormy night, he was drowned, and his body was washed up to the tower. Seeing the lifeless form of her lover, Hero plunged into the water that she might join him in death. The English poet Byron, who himself accomplished the difficult feat of swimming the Hellespont, refers to the tale in those well-known lines:

> The winds are high on Helle's wave,
> As on that night of stormy water
> When Love, who sent, forgot to save
> The young, the beautiful, the brave,
> The lonely hope of Sestos' daughter.

HEROD. The family name of several rulers in Palestine, of whom Herod the Great, king of Jndaea from 37 B.C. to 4 B.C., was the most conspicuous. Scholars in general hold that Jesus of Nazareth was born towards the end of this reign. Herod Antipas, son of Herod the Great and tetrarch (tributary prince) of Galilee from 4 B.C. to 39 A.D., is the Herod most frequently mentioned in the New Testament; it was to him that Jesus was sent by Pontius Pilate.

Herodias, the granddaughter of Herod the Great and wife of Herod Antipas, instigated her daughter Salome (by her first husband) to ask of Antipas, whom she charmed by her dancing, the head of John the Baptist on a charger (a large flat plate), and this was granted her. John had angered Herodias by denouncing Herod Antipas for casting aside his first wife for her. Several operas have been based on this story, which is also a favorite subject in painting.

HEROD'OTUS (about 484–425 B.C.). The Father of History, as Herodotus is called, was born at Halicarnassus, a Greek colony on the shores of Asia Minor. He early devoted himself to a literary life and traveled extensively, visiting the shores of the Hellespont and the Black Sea (Euxine), as well as Scythia, Syria, Palestine, Babylon, Egypt, and the northern part of Africa. He investigated both the customs and religion of the peoples and the history of the countries through which he passed. He made use of the material which he gathered in his great work—the first specifically historical work ever written. The special purpose of Herodotus' work, which consists of nine books, is to give an account of the conflict between the Greeks and the Persians, whose history and enmity Herodotus traces back to mythical times. Incidentally it is a treasure-store for the early history of all the lands about the Eastern Mediterranean. Much of this early history, as narrated by Herodotus in his fascinating volumes, has been modified by the excavations and other researches of recent times; but considering the difficulties under which Herodotus collected his information, he is amazingly accurate.

HERONS. A family of long-legged wading birds, which includes also the bitterns and the night-herons. There are about 100 species, of which 12 occur in North America. They range in size from the great blue heron, four feet high, to the little green heron, the most familiar species in the United States, which measures 18 inches. Among them is the lovely egret, whose long white plumes have brought it such a tragic fate. (*See* Storks, Herons, and Cranes.)

HERRING. Economically the herring is the most important of all the families of fishes, for in addition to the typical fish of the family, the herring proper, it includes the shad, alewife, sardine and other food fishes, and also the menhaden. The menhaden is a very oily fish found in great schools off the east coast of the United States and taken chiefly for bait, manure, and for its oil.

The common herring is of immense value as a food fish, being used extensively both fresh and smoked or salted. A favorite preparation is the partly smoked form of "bloaters." Great quantities of young herring are canned and sold as sardines. Herring are found in incredible numbers in the North Sea, the north Atlantic, and the seas north of Asia. They swim in closely packed schools often covering areas of from 6 to 20 square miles. In the United States the chief fisheries are off the coast of Maine. A species similar to the common herring is found on the Pacific coast of America. The true herring belongs to the genus *Clupea*.

HESSIAN FLY. Tiny though it is—about one-eighth of an inch long—this insect pest does more damage to the grain field than any other. Its *larvae* or young suck the sap out of the tender shoots of wheat, rye, and barley, and kill about 10 per cent of the entire wheat crop of the United States and Canada. This means a loss of from 60,000,000 to 100,000,000 bushels of wheat every year in the United States alone—enough to feed several great cities for a whole year.

The Hessian fly has long legs, long feathery antennae, or feelers, and oval, rather small gauzy wings. It belongs in the same family with the gall-gnats, wheat midges, etc. The eggs are laid in the sheaths of the leaves of the young plant, and the little flattened pale red maggots eat into a joint near the base of the stem just where the leaf fits onto the stalk. Before they grow into adult flies they pass through the pupal stage, in which they resemble, and are called, flaxseeds. The female lays from 100 to 150 eggs, which hatch in about five days. From two to five broods are raised each year. Since only those in the flaxseed stage live through the winter, the insect can be destroyed by burning the stubble.

The fly gets its name from the common belief that it was brought into America by the Hessian troops during the War of the Revolution. Scientific name, *Cecidomyia destructor*.

SLEEP *that* LASTS *All* WINTER LONG

While the Grip of Ice and Snow is on the Land, Many Animals Withdraw to Shelters beyond the Reach of Frost and Remain in Deathlike Slumber until Warm Weather Returns—How They Live on Their Stored-up Fat

HIBERNATION. In northern countries the great majority of insects, worms, etc., and of the marine life fixed between high and low tide range, die in winter, leaving larvae to revive their race in the succeeding spring. Fishes of brooks and shallow streams, and of the shallows near shore, retire to deeper water. Most birds flee southward to a milder climate. This leaves a large body of terrestrial animals of various classes which, so far as passing the winter is concerned, may be divided roughly into two classes—those able to obtain food during the snowy season, and those whose food supply is cut off by wintry conditions.

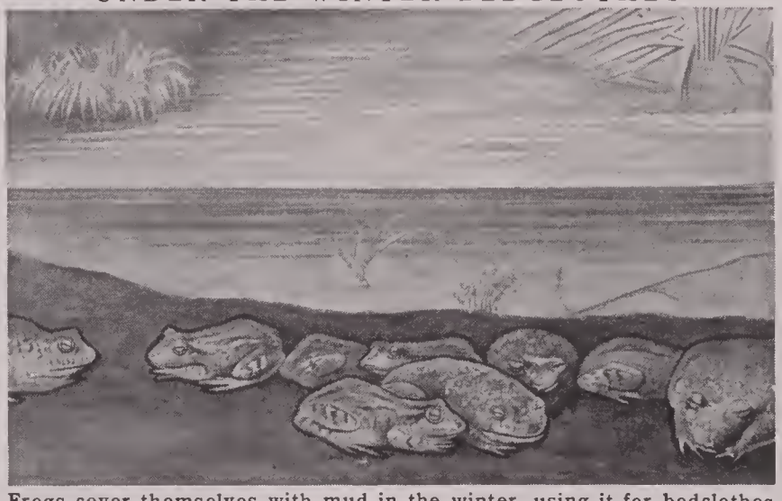
LITTLE DORMOUSE'S LONG REST



Just before it is time to "turn in" for the winter, the Dormice get as fat as butter. Then they curl up in winter beds, and spend most of their time dozing until spring.

For these latter the only alternative to death is hibernation—sleep in a sheltered place; and it is resorted to by all kinds of northern animals except birds and fishes. Earthworms burrow below the reach of frost. All manner of insects in their pupa stages lie inert within cocoons or earthen caskets. Frogs bury themselves deeply in the mud of the pond or in loose soil and rotting stumps. Serpents coil up in crevices of rocks or holes in the ground. And certain four-footed animals occupy deep burrows or warm nests, where many of them pass from the pseudo-death of sleep to the reality, and find their *hibernaculum* (sleeping-place) a grave.

UNDER THE WINTER BEDCLOTHES



Frogs cover themselves with mud in the winter, using it for bedclothes during their long sleep.

In almost all cases of hibernation the animal is one that is unable to get its accustomed food in winter, and has not learned to gather and save under cover a store of imperishable sustenance, such as nuts, seeds, dried fungi, and the like. Yet even the true hibernators prepare unconsciously for the ordeal by accumulating much fat, eating amply in the abundance of autumn, when nature's bounty is greatest, and storing up in their bodies the fuel and sustenance that shall gradually be absorbed for the nourishment of their systems during the long weeks of their dormancy.

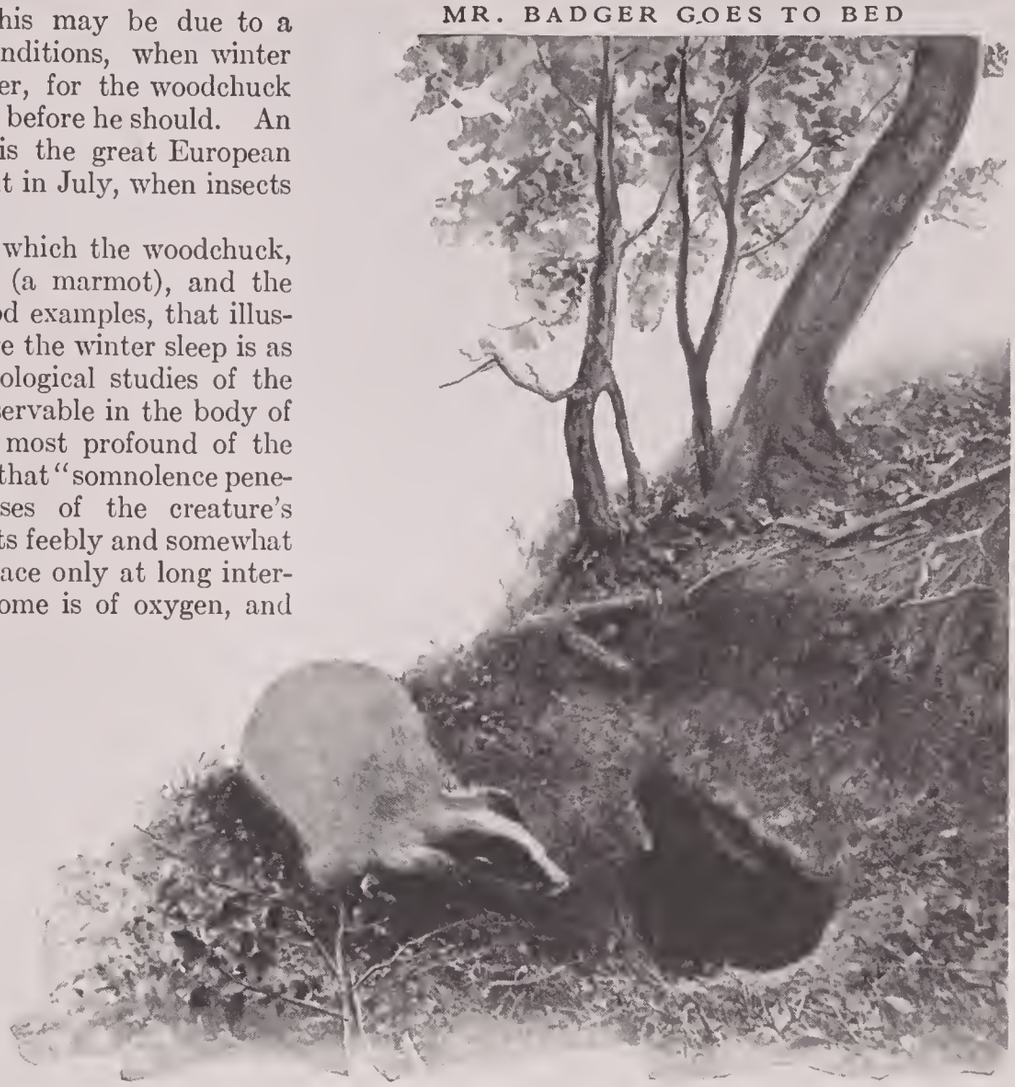
What is the nature of this dormancy? We do not know. It seems not to be different from ordinary slumber except in its depth and prolonged duration, and hibernating animals differ much in the soundness of their sleep. Some, such as our bats, the chipmunk, and the red squirrel, are light sleepers, and often on mild days will wake up, come out, and move about indolently until the return of cold sends them back to bed. Bears are popularly regarded as special examples of hibernation, but they are among the most irregular. In very cold and snowy countries the females "den up" early and may be snowed under for weeks. They do not go into torpidity, but simply lie quietly, subsisting on their accumulated fat, the slow assimilation of which sustains their own life, and enables them to nurse the babies which are born during this winter retirement. It is thus the female ice bear passes the cold months, but the males are abroad during all the long, dark, polar night, even as far north as men have ever gone. In the case of other northern species the males also hibernate, each by itself, but are liable to come out from time to time.

From the central United States southward the bear need not hibernate at all. This is true of several other animals which must sink into a state of dormant vitality in sub-arctic regions, or on high mountain tops. Another irregularity, exceptional in relation to the food supply, is shown in the woodchuck, which retires to its snug underground bedroom much before the ordinary time of severe frost and snow, and while plenty of green herbage

remains for its nibbling. This may be due to a habit inherited from former conditions, when winter came earlier and ended earlier, for the woodchuck often comes out in spring long before he should. An even more striking example is the great European bat, which begins its retirement in July, when insects are still plentiful.

It is the heavy sleepers, of which the woodchuck, the Rocky Mountain siffleur (a marmot), and the jumping mice (*Zapus*) are good examples, that illustrate the condition best. Here the winter sleep is as near death as possible. Histological studies of the minute structural changes observable in the body of a hibernating hedgehog—the most profound of the European hibernators—shows that "somnolence penetrates to the deepest recesses of the creature's constitution." The heart beats feebly and somewhat irregularly, breathing takes place only at long intervals and slowly, the only income is of oxygen, and the excretions are slight. The fat is slowly burnt away, the body cools down to a degree that in ordinary life would be fatal, and the senses fail to respond, except slightly to touch. Prof. Wesley Mills, who experimented largely with a dormant Canadian woodchuck, found that although you might roll it about like a football, apparently without the animal knowing it, gentle stroking of its fur produced uneasy movements of the skin as if it felt an unpleasant tickling. These sleepers may be awakened by warmth, but only to a stupid state, and close their eyes as soon as permitted.

MR. BADGER GOES TO BED



These trees must have on their autumn leaves, for it is in October that Mr. Badger goes into his burrow for the winter. When he comes out in the spring, he's in very good condition after his long fast, and not thin and weak like Mr. Bear.

"The general import of hibernation is in most cases plain," remarks Prof. J. Arthur Thomson. "Life saves itself by ceasing to struggle, by retiring within its entrenchments. Death is baffled by a deep device, in which activity virtually ceases without life itself being surrendered."

DEEP DOWN BELOW THE REACH OF FROST



The Earthworm seems to know exactly how cold it is going to be, for he crawls down and coils up just below the frost line.

Hickory. In late autumn the wood-lots resound with the laughter and shouts of the schoolchildren who eagerly search among the dry leaves for the fallen hickory nuts, gathering an abundant store with which to while away the long winter evenings. The squirrels, too, find these nuts to their liking, and chatter noisily in the tree, fearful lest the children rob them of their winter's food supply.

The hickory is an American forest tree belonging to the walnut family. It is at its best in the southeastern United States. There are about ten species. The most popular is the small nut shagbark or shellbark hickory, native from southern Maine to Florida and westward to Texas. The tree is rather large, with a spreading top covered with narrow yellowish-green leaves. The nuts when freed from their husks

BIOGRAPHY OF A HICKORY NUT



In this life story of the Hickory Nut, we first see the bud, in the upper left-hand corner. In the next six pictures we observe the opening of the leaves. Then the tree blooms. Last of all come the nuts. The ones on the last picture are of the variety known as the "shagbark" or "shellbark" hickory, which delight children and squirrels in the autumn nut-gathering season, from southern Maine to Florida and westward to Texas. The nuts when green are surrounded by tough husks, which fall off, however, when the nuts ripen, leaving the hard whitish shell exposed.

For any subject not found in its alphabetical place see information

have a hard whitish shell and are finely flavored. The big shellbark is similar to the small shellbark, but the nuts are larger and have thicker shells. The nuts of almost all species are edible, being sweet and tasty.

The "pig-nut," however, is an exception, as its thin-husked nuts are bitter and astringent. The "pecan" is a species of hickory; its nuts are so valued that the tree is widely cultivated in the southern part of the United States.

The wood of the hickory is of great value for articles requiring strength combined with lightness and elasticity. It is much used for ax, pick, and tool handles, for carriage shafts and thills, and similar purposes.

Scientific name of the small shellbark, *Hicoria ovata;* of the big shellbark, *Hicoria laciniosa.* Bark gray, loosely attached, breaking into long loose strips, which curve away from the tree. Leaves compound, alternate, odd-pinnate, narrow, dark yellowish-green. Fruit a whitish ovate nut inclosed in a thick four-valved hull, which (unlike the black walnut) falls away from the nut when ripe, exposing the hard tough shell.

THE "SHAGBARK"



The Shagbark Hickory has its name written all over it, hasn't it? And you know how the bark shells off. You can pick it out every time in the woods.

HIEROGLYPH'ICS. From two Greek words meaning "sacred" and "carving"; it was used by Greek and Latin writers to describe the sacred characters of the ancient Egyptian language. It is now applied also to other systems of writing in which figures of objects take the place of purely conventional signs, such as the characters used by the Chinese. (*See* Writing.)

HILL, JAMES JEROME (1838–1916). The career of James J. Hill, empire builder of the Northwest, was based on one great idea. He started out in life as a poor boy, and until he was 40 he had accomplished nothing more than hundreds of other successful business men. But years before he had conceived the idea of building a great railroad system through the undeveloped Northwest; and while his friends thought it was too much of a dream to be taken seriously, he kept working and planning till finally he got his opportunity. "From the time he first conceived it," said an old friend, "he was possessed by the railroad scheme. He used to talk it at all times. He ate and drank and slept with it."

He was born near Guelph, Ontario, of Scotch-Irish parents; but upon the death of his father he left his job in a country store and came from Canada to the United States. He arrived in St. Paul, Minn., then a frontier village, when he was 18 years old, and took whatever work he could get. He was at various times shipping clerk, railroad station agent, and trader; and while he was a trader he traveled overland many times to Winnipeg, sometimes by oxcart, sometimes on horseback, and sometimes with dog sledges. In this way he came to know the Northwest; he saw its agricultural possibilities and he learned something of the great mineral wealth that lay in the Lake Superior region. He knew that a railroad, once built through that territory, would be a success. In the meantime he did what was nearest at hand and acquired a modest fortune.

Hill's chance came in 1878. With three other men he formed a syndicate which purchased the St. Paul and Pacific Railroad, a bankrupt line into which investors had poured millions of dollars. The road had never made any profits, and though it had a valuable right-of-way leading to the Northwest, comparatively little construction work had been done.

In just 15 years Hill had not only turned failure into success, but had extended the system across the continent to Seattle. This feat was accomplished, moreover, without government assistance, though it was a time when nearly every western railroad received public land grants. In the meantime he developed steamship lines on the Great Lakes and the Pacific and made them a part of what we now call the Great Northern system.

One secret of his success as a railroad builder was his intense interest in furthering the development of the Northwest. He did not sit back and wait for the country to become prosperous; he made it prosperous by encouraging homeseekers to settle in the new territory and assisting them on the road to prosperity. Importing pedigreed horses and cattle from England, and selling them at low prices to farmers, was typical of his methods of encouragement. In later years his sound and practical judgment on national problems of all sorts was eagerly sought.

HIMALAYA (*hĭ-mä'là-yà*) **MOUNTAINS.** By comparison the Himalayan is not an extensive mountain system. Its length of 1,500 miles is but little longer than the Appalachians and its width is no greater than that of the Andes in Chile. But in elevation it is unique. From the southern of its two parallel ranges, between 40 and 50 peaks spring more than 23,000 feet in the air, overtopping all other mountains on the earth. Mount Everest, the highest of the Himalayas, is 29,002 feet, or over five and a half miles high; and the average elevation of the passes is 18,000 feet.

Lying on the northern frontier of India, the Himalayas extend from the great bend of the Indus River to the Brahmaputra of Indo-China, and separate the plateau of Tibet from the plains of the Ganges. They are located in the sub-tropic latitude,

A VILLAGE ON THE SLOPES OF THE WORLD'S LOFTIEST MOUNTAINS



The hill tribes of India rarely have to complain of the heat, for they live away up in the Himalayas where it is usually cool. You see that they have nice warm houses neatly built of the stones of the mountains and with the windows high up, so that even the deep winter snows can't get into them. These hill tribes are largely of Mongol and Tatar race, descendants of the early invaders of India.

so the snow line is lifted to 16,000 feet. The lofty southern range forms a wall which intercepts the heat and moisture from the Indian Ocean. At some points on the southern slope 600 inches of rain fall in the course of a year, while the inner range and the Tibetan table-land are dry, cold, and half-desert.

Up to 5,000 feet on the southern slope the tea plant is cultivated in the famous gardens of Darjeeling and other places. Here, and at Simla and elsewhere, are fashionable pleasure and health resorts for civilians and British-Indian soldiers. Grains and fruits are grown up to 12,000 feet, and in the summer months herds of cattle are pastured on grassy slopes up to 18,000 feet. Tigers, leopards, and apes are perils of the habitable regions. The passes are blocked with snow from November to May. From melting snow and glacial fields, innumerable streams and cascades drop down through wild gorges to supply India's three great rivers with the floods which they pour every summer into the Indian Ocean.

Because of the majestic height and inaccessibility of many of the summits, the Hindus from ancient times have held the Himalayas in reverence as the home of the gods. Pious pilgrims still ascend to the source of the sacred Ganges for seasons of penitence and prayer. To people coming up from the steaming heat of the valleys, the greatest marvel of all is the snow-mantled, jagged ridgepole of this "roof of the world." The name Himalaya is from two Sanskrit words which mean "dwelling-place of the snow." (*See* Map with article on Asia.)

HINDENBURG, PAUL VON (1847–). When the World War broke out in 1914, General Hindenburg was 67 years old, a retired soldier living on his pension. In German military circles he was known chiefly as an enthusiast on the Mazurian Lakes region of East Prussia, which he had for years been demonstrating to be an ideal battlefield against an invasion from Russia. Even after his retirement he haunted the region, becoming intimately acquainted with every foot of the ground. Then the Russians overran East Prussia, and the test of his theory came. The emperor hurriedly telegraphed for him to take immediate command of the eastern army. By brilliant strategy Hindenburg kept two Russian armies apart while he closed in upon one of them and drove whole regiments into the lakes and bottomless mires. This Battle of Tannenburg was one of the greatest single disasters of the war.

The victory made him a national idol, and led the Kaiser to create him field marshal. In 1916 he was made chief of the German General Staff, succeeding von Falkenhayn. In 1917 his principal achievement was the German strategic retreat on the western

front to the fortified "Hindenburg line," making possible the success of German operations in the east against Rumania and Russia. The German drive on the western front in 1918 was apparently due to Ludendorff's influence. In the collapse which followed, Hindenburg lent his aid to the new German government to prevent anarchy.

HINDUISM. The great majority of the peoples of India today are Hindus, and the name "Hinduism" is given to the strangely complicated combination of religious beliefs and social customs which governs them. Unlike other great religions it does not owe its origin to any single person, but seems to have grown up through the slow transformation of very ancient beliefs. When the Aryan conquerors (Hindus) first appeared in northern India, about 1500 B.C. (*see* India), there gradually arose a series of sacred writings in the Sanskrit called the *Vedas;* these expressed a lofty and mystical pantheism—that is, a belief in one "divine Being," which included all knowledge and all Nature within itself.

These Vedas show us this early Aryan society divided into four social castes—the Brahmans or priestly caste, the Kshatriyas or soldier caste, the Vaisyas or farmer class, and the Sudras or laborers. Early in their history, the Brahmans gained political as well as religious supremacy over the Kshatriyas, and established the religion called Brahmanism, set forth in writings called "Brahmanas," which are commentaries on the old Vedas. Gradually, pantheism gave way to a religion of personal gods, of which Brahma, the "Father of all," Vishnu, the "Preserver," and Siva, the "Destroyer," were the most important.

As the native tribes of India were conquered one by one by the Aryans, the Brahmans found it wise to allow the new converts to retain many of their old beliefs and primitive religious customs. Opposition to this adulteration of the old religion was in part responsible for the foundation in the 6th century B.C. of Buddhism and Jainism (*see* Buddha; India), but the Brahmans prevailed.

Today, Brahmanism has ceased to exist as a separate faith, being swamped beneath the mass of popular beliefs and rituals, and later introductions such as Mohammedanism and Christianity. Scores of sects have grown up, some emphasizing the worship of Vishnu, others of Siva, others setting up newer gods and goddesses. Most of the sects base their practices upon popular religious treatises of comparatively recent origin, called "puranas." At the same time the old fourfold caste system has split into thousands of branches and sub-castes, each with its peculiar rites and restrictions.

Most true followers of Hinduism, however, continue to look upon the Brahman caste as their leaders, and to observe broadly similar rules regarding food, marriage, and burial. One of the most interesting of the Hindu beliefs is the transmigration of souls, or "metempsychosis." According to this doctrine the soul of a person passes at death into some other creature, either human or animal. If the person has led a good life, the soul goes upward in the scale—a low-caste, for instance, is reborn as a high-caste; but if the person has led an evil life, the soul may pass into the body of a dog or a pig or any other animal. Everything in this life, say the Hindus, is a consequence of actions performed in a previous existence, and only by the gradual building up of a fine record or "karma" can final salvation be achieved. This doctrine is a very old one and was taken over in large part by the Buddhists when they split off from Brahmanism.

The Hindu gods are supposed to have undergone a series of incarnations or "avatars" similar to those through which men must pass. Thus the god Krishna is looked upon merely as a form of the god Vishnu.

HIPPOPOT'AMUS. "My, ain't he *plain!*" was one exclamation called forth by the first sight of a hippopotamus at the zoo. With its body like a sawed-off elephant, its little pig eyes, its broad-muzzled head, showing a frightful chasm when it yawns, the "hippo" is surely the "plainest" mammal in existence. Its ponderous clumsy body and short stocky legs would scarcely lead one to think of it as an expert swimmer and diver. But in fact it is more at home in the water than on land.

The name hippopotamus means "water horse," but this African animal is really related to the pigs. The hippopotamus is the largest existing land mammal next to the elephant. The largest specimens of the common hippopotamus measure 12 to 14 feet in length and about 5 feet or more in height, and may weigh as much as 4 tons. The body is covered with a hide 1½ inches thick on its back and sides, and hairless except at the tip of the tail. Its huge red mouth is furnished with large teeth—tusks in the lower jaw. It can close its large nostrils and short ears when under water.

During the day the hippopotamus remains in the water, often in herds of 20 to 40. At times it disappears beneath the water for 8 or 10 minutes at a time, spouting and snorting when it comes to the surface. When excited or in pain the body is covered with drops of a reddish fluid, which gives rise to the saying that the hippopotamus "sweats blood"; but the blood forms no part of this reddish sweat. At night the hippopotamuses (or hippopotami) go to pasture, feeding on water plants and grasses. They often journey 8 or 9 miles in search of good pasture and sometimes make inroads on cultivated fields. For this reason they have been exterminated in most settled districts. The natives also hunt the hippopotamus for its flesh as well as for its teeth, which are superior to ivory in hardness. The explorer Sir Samuel Baker says of a wounded hippopotamus, which he saw leave the water and gallop savagely inland: "I never could have imagined that so unwieldy an animal could have exhibited such speed. No man could have had a chance of escape."

HE'S A LITTLE TIRED—THAT'S ALL



You really couldn't ask a Hippopotamus to cover up his mouth when he yawns. It would take a bale of hay to conceal that cavity. In spite of his fearful looking pair of jaws, the "Water Horse" is timid and inoffensive unless he is infuriated. With those long tusks he can root up grass like a steam plow.

For any subject not found in its alphabetical place see information

Though formerly plentiful in Egypt, the hippopotamus is now found only in equatorial Africa. It is thought that the common hippopotamus was found formerly in the Jordan valley also, and that it is the "behemoth" mentioned in the Bible. It is not difficult to keep in captivity. For many years a hippopotamus named "Miss Murphy" was to be seen in Central Park, New York, and it was always a delight to children to see the skill with which she caught in her huge mouth the loaves of bread tossed to her at feeding time.

In addition to the common hippopotamus there is a pygmy species (*Hippopotamus liberiensis*), about 2½ feet high and 6 feet long, which weighs when full grown only about 400 pounds. This species is found chiefly in Liberia and neighboring regions.



HISTORY. To read history is like visiting strange far-off lands. Like travel, it takes us out of the narrowness and commonplace of everyday life, and shows us the wonderful panorama or moving picture of man in his slow ascent from earliest savagery to modern civilization. The stupendous series goes back to "the times of the old patriarchs with their flocks and herds, the keen-eyed Greek, the stately Roman, the watching Jew, the uncouth Goth, the horrid Hun, the settled picture of the unchanging East, the restless shifting of the rapid West, the rise of the cold and classical civilization, its fall, the rough impetuous Middle Ages, the vague warm picture of ourselves and home."

Someone has said that "History is Philosophy teaching by example." Certainly to be "historically minded" is to see things in relation and in perspective, to judge tolerantly, remembering how differently men have thought and acted in different times, and always to keep an open mind, ready to receive and weigh new evidence. If one grasps this idea, he will never think that being a historian means an ability to remember dates. That childish idea is like calling a man a statesman who can remember the names of voters in his districts. A waiter could remember more names and a telephone operator more numbers than the greatest historian.

The true historian is not content to take all his facts from other historians. Today he makes sure that his statements are based on sound "documents" or "sources" which go back to the time of the facts themselves. Those sources are of all kinds—ruined monuments, old tombs, and other material remains; legal papers, letters, diaries, newspapers, and written or printed narratives of eye-witnesses, even myths and fables; contemporary pictures, drawings, photographs, and the like. Sometimes the discovery or the finding the key to new sources—such as the hieroglyphs of ancient Egypt or the cuneiform tablets of Babylonia and Assyria—adds whole new realms to our historical knowledge.

But the historian needs continually to be on his guard not to be misled by his sources. A document may be entirely forged; its author may be deliberately lying; he may be so prejudiced by national, religious, party, or personal bias as to be grossly unfair to the other side; and if honest, he may be misinformed as to the facts and mistaken in his inferences. Scores of pitfalls must be avoided by the research worker in this fascinating field.

contained in the Easy Reference Fact-Index at the end of this work

Anyone who reads the accounts put forth by the different countries concerning the origin of the World War, or who sees how widely the reports of political affairs in Republican newspapers differ from those in Democratic ones today, will realize that the historian needs caution and training in handling his sources.

"Criticism for good faith and accuracy" has become a special branch of learning. Every trained historian asks, "Did this writer mean to tell the truth?" And second, "Was he in a position or frame of mind to tell the truth even if he wanted to?" Every statement therefore must be patiently weighed and tested, and combined with all other available information to get at the truth. As a result of such training it has well been said that "by the mechanism now at his command the scientific explorer can read more history from the dust heaps of Abydos than Herodotus, the greatest traveler of antiquity, could gather from the Egyptian priests of Saïs."

"In a certain sense all men are historians. Is not every memory written quite full with Annals, wherein joy and mourning, conquest and loss manifoldly alternate; and, with or without philosophy, the whole fortunes of one little inward Kingdom and all its politics, foreign and domestic, stand ineffaceably recorded. . . . Thus, as we do nothing but enact History, we say little but recite it: nay rather, in that widest sense, our whole spiritual life is built thereon. For, strictly considered, what is all Knowledge too but recorded Experience, and a product of History; of which, therefore, Reasoning and Belief, no less than Action and Passion are essential materials?"—Thomas Carlyle.

Formerly history was regarded chiefly as a branch of literature, and a pleasing style was considered of first importance. Today the emphasis is placed, as in science and other branches of study, mainly upon accuracy of facts, and the soundness and breadth of the understanding which the historian presents of man's life in the period with which he deals.

History is really a ceaselessly flowing stream, ever widening and deepening its course; but for convenience we divide it into more or less artificial periods. This does no harm if we remember that changes in history, like changes of the seasons, are gradual, and each period passes into the next as imperceptibly as winter into spring, or as life undergoes the slow but constant changes from childhood to youth, manhood, and old age.

To the long period before written records begin when man was taking his first steps in the arts which make up civilization, we give the name Prehistoric Age (*see* Stone Age). Ancient History covers more than half the span of our recorded knowledge. It stretches from the beginnings of Assyrian and Egyptian inscriptions, through "the glory that was Greece, the grandeur that was Rome," to the coming into the Roman Empire of the Germanic barbarians who overthrew classical civilization (about 3000 B.C. to about 375 A.D.).

The Middle Ages extend from 375 A.D. to about 1500. This period starts with an epoch of confusion and transition which lasts to about 800 A.D.; to it (if anywhere) the term "Dark Age" may be applied. Then comes the height of the Middle Ages, from Charlemagne to Dante (800 to 1300), when feudalism, monasticism, scholasticism, the Crusades, and Gothic architecture flourished, and a world empire and a world papacy confronted each other and strove for mastery. The period closes with a second epoch of transition (1300 to 1500), which we call the Renaissance (*see* Renaissance). Since 1500 we have the Modern Period, characterized by the organization into national states, the spread of discovery and European settlement, the progress of science and inventions, and the rise of democracy.

Altogether, written records go back only about 5,000 years. Geologists, however, believe that the earth is at least 100,000,000 years old, and that man has perhaps inhabited it for 50,000 years. To give some idea of the short duration of recorded history compared with this vast expanse of time, Prof. J. H. Robinson asks us to imagine a library of ten volumes of a thousand pages each, one page for every 5,000 years that the earth has existed. The whole of recorded history from the earliest Assyrian and Egyptian inscriptions to the present day would scarcely cover the last page of that stupendous journal!

If history as a study is often dull and dry, a mere catalog of names and dates of rulers and battles and treaties, it is the fault of the books and not of history itself. Nothing can be more fascinating than the true story of how men and women have lived their lives in the past and in far distant lands—their houses, food and clothing, how they cultivated their fields and manufactured goods and traded with their neighbors, the games their children played and the parents' beliefs about God and the world of Nature, their laws and manner of government, the songs their poets sang and the beautiful things their artists made. All of this is included in the history which scholars today study and teach.

Even wars and political struggles are interesting when we once know what they were about and how they were carried on, and become well enough acquainted with the heroes and leaders to feel that they were real men and women dealing with things that were of vast importance to their peoples. The great English historian Freeman once wrote that "History is past Politics and Politics present History." But this view, equally with the "drum and trumpet" view of history, is too narrow; and today the historian includes in his survey the whole life of man in the past as discoverable from documents and all other "sources" which may shed light on the subject.

HISTORY SHOWN IN CHARTS

HISTORICAL charts are to history what maps are to geography. They help us to visualize the facts—to fix them in *time* as maps do in *space*—and so aid both the understanding and memory. When the history of the chief countries is shown in parallel columns, as here, there is the added advantage of "synchronizing" the events.

A glance across these pages will enable you to see at once what was happening in the different countries in any period. Thus a child will quickly discover that when the Greeks were besieging Troy, the great empire in Egypt was already declining, Samuel was ruling in Israel, and Tiglath-Pileser I and his wandering armies were gazing out across the Mediterranean. He will learn that some of the Norman knights who invaded England with William the Conqueror lived to take part in the First Crusade, and that shortly before that conquest the Northmen discovered America; and that in the same century that the Puritans were settling Plymouth and Boston, there was revolution and civil war in England, Huguenots were persecuted in France, a great religious war was fought in Germany, and the Dutch finally won their independence from Spain. This graphic arrangement of contemporaneous events is particularly valuable in teaching the child to regard history, not as a collection of disconnected incidents, but as a series of related movements, each contributing to the progress of civilization and the advancement of the human race.

PREHISTORIC PERIOD

125,000(?)-10,000(?) B.C. **Old Stone Age.** 25,000(?). **Last Glacial Age Ends.** 10,000(?). **Neolithic (New Stone) Age Begins**

HISTORIC PERIOD —— I. ANCIENT HISTORY

B. C	EGYPT	PALESTINE AND SYRIA	BABYLONIA AND ASSYRIA	AEGEAN REGION AND GREECE	ITALY
	New Stone Age in Nile Valley. **Predynastic period;** many little kingdoms. 4241. **First fixed date in history;** Egyptian calendar established. 3400. **Menes** unites Egypt into one kingdom: beginning of **dynastic period.**		5000–2750. **Sumerian city kingdoms** (non-Semitic). Early development of cuneiform writing.	New Stone Age in **Crete** before 4000.	New Stone Age in Italy.
3000	3000–2500. **PYRAMID AGE;** high cultural development under IVth Dynasty; capital at **Memphis** (lower Egypt). Great Pyramid at Gizeh (2900). 2400. Removal of capital to **Thebes** (upper Egypt). 2100. Hyksos (Shepherd) kings conquer Egypt.	3000–2500. **Canaanites,** a Semitic people, move into Palestine. 2550–2000 **Phoenicians** (another wave of Semites) settle in Palestine	2750–2550. **Semites** under **Sargon** of Akkad **conquer Sumeria.** 2500–2200. Rule of Semitic kings of Sumer and Akkad; Babylonian Empire. 2130–2090. **Hammurabi of Babylon** conquers Akkad and Sumeria (**code of laws** issued).	3000–2800. Transition from Stone to Bronze Age. Dawn of European civilization in **Crete.** 2800–1200. **Minoan Age in Crete;** high civilization with capital at Cnossus. 2500–2000. Second city of Troy flourished.	
2000	1800–1600. Hyksos kings expelled. 1580. Founding of New Empire (XVIIIth Dynasty). 1501–1447. **Thutmose III** conquers Palestine, Phoenicia, and Syria; **greatest conqueror among Pharaohs.** 1411–1375. **Amenhotep III;** magnificent palaces and temples at Thebes. 1375. **Amenhotep IV** (Ikhenaton) tries to reform old religion. 1225(?). **Rameses II** (Sesostris) completes Great Hall at Karnak. 1150. Beginning of **Egyptian decline.**	2000. **Abraham** leaves Ur, in southern Babylonia; enters southern Palestine. 1550. **Joseph** and his brethren go into Egypt. 1400–1200. **Great immigration of Hebrews** (Jews) **into Canaan.** 1225(?). **Moses** leads Jews out of Egypt; the Ten Commandments. 1200–1030. **Rule of Judges; Samuel** the last judge. 1030. **Saul** becomes first king of the Jews.	1900. **Assyria** (north) **settled** by immigrants from Babylonia (south). Kassite immigrants from **Elam** gradually absorb power in Babylonia and establish Kassite dynasty (1780–1200?). 1400. Babylonia has well-established diplomatic and commercial relations with Egypt. 1300. **Constant wars of Assyria** with **Babylonia.** 1100 **Tiglath-Pileser I** of Assyria conquers to the Mediterranean.	2000–1500. 3d, 4th, and 5th cities of Troy built. 1600–1100. 6th city of Troy built (Homeric city) **1500-1450. GOLDEN AGE OF CRETE.** 1500–1100 Greatness of **Mycenae,** Tiryns, etc. 1450–1200 **Hittite Empire** in Asia Minor. 1500–1000. Greek (Achean) **colonization of Greece** and islands. Dorian and Ionian conquests and colonization follow **1100. Fall of Troy** following siege by Greeks; gradual growth of hero songs about the siege.	2000. Lake dwellers occupy Italian lakes.
1000	945. Libyan rulers succeed line of priestly rulers of Thebes (XXIst Dynasty). 926. Sheshonk I plunders **Jerusalem** (XXIId Dynasty).	1000. **David** becomes king; capital at Jerusalem 1000–700. **Phoenician cities at height of their power.** 960. **Solomon** becomes king; temple dedicated. 930. Kingdom divided into **Israel** and **Judah.** 926. **Jerusalem plundered** by Egyptians.	930–626(?). **Brilliant period of Assyrian history** (great activity in architecture, literature, and sculpture as well as in military conquests).	1000–900. **Greek colonization** of Aegean islands and Asia Minor extended.	1000. **Etruscans** come into Italy (probably from Asia Minor by sea). 1000. **Latin** villages established along Tiber.
900		**Period of the Prophets** (Elijah, Elisha).	885–860. Assurnazirpal restores the empire of Tiglath-Pileser I; marches to Mediterranean.	900–800. **'Iliad'** and **'Odyssey'** composed (by Homer?). 820. **Lycurgus** frames laws for Sparta.	
800	800. Egypt again divided among **many small kingdoms** (XXIIId Dynasty).	The Prophets: Amos, Joel, Hezekiah, Isaiah.	**750-606. ASSYRIAN EMPIRE** at its height. 742–727. **Babylonia subjugated by Tiglath-Pileser III** of Assyria. Assyrian rule extended to **Egypt.**	800–700. **Rise of aristocracies** in Greece. 776. Traditional date of first record of Olympic games (**1st Olympiad**). 750–650. **Sparta** conquers Messenia; becomes a military power.	**753** (traditional date). **Rome founded.** 750. Etruscan kings invade Latin towns.

B. C.	EGYPT	PALESTINE AND SYRIA	BABYLONIA, ASSYRIA, AND PERSIA	GREECE	ITALY AND ROME
	722. **Ethiopian rulers** gain Egyptian throne (XXVth Dynasty).	722. **Israel destroyed**; people carried to **Assyria**. 701(?). Assyrians besiege Jerusalem (**Isaiah's** prophecies).	722–705. **Conquests of Sargon II** (palace of Nineveh). 722. Conquest of Israel; people made captive. 705–681. **Sennacherib**; walls and temples of **Babylon razed** following revolt.	734 (traditional date). **Syracuse** founded in Sicily. 708. **Tarentum** founded in Southern Italy	
700	670–661. **Assyrians conquer Egypt**; plunder Thebes. 663. Egyptian rulers restored (XXVIth Dynasty); **revival of power and art.** 609–594. Necho II digs **canal from Nile to Red Sea**; Africa circumnavigated.	Prophet **Jeremiah.**	681–668. **Esarhaddon; Assyria at its height.** 640. **Revolt of the Medes.** **606–604. Chaldeans** move into Assyria from the desert; **Nineveh destroyed; end of Assyrian Empire.** **606–539. CHALDEAN (NEW BABYLONIAN) EMPIRE.** 604–561. **Nebuchadnezzar**; wars in Palestine and Syria; **Hanging Gardens of Babylon built.**	650–600. **Rise of tyrannies** in Ionia; established in **Corinth**, Megara, etc. 630. Cyrene founded in Africa. 621. Code of Laws for Athens issued by **Draco.**	700. **Greek colonies in Sicily and Southern Italy.**
600	525. Psammetichus III conquered; Egypt a **Persian province.**	**586. Jerusalem captured** by Babylonians; temple burned (**Babylonian captivity**). 539. **Return of Jews**; temple rebuilt; Palestine **subject to Persia** (until 332). Prophet **Zechariah.**	586. Capture of **Jerusalem**; Jews carried to Babylon. 539. **Babylon taken by Cyrus the Great**; becomes Persian province. **539–330. MEDO-PERSIAN EMPIRE.** Lydia conquered (capture of Sardis, 546). 528–521. Cambyses; conquers **Egypt.** 521–485. **Darius I rules from Aegean and Egypt to India**; advances to Danube against Scythians (513); revolt of Greeks in Asia Minor (500); **two expeditions against Greece** (493, 490).	594–593. **Solon**, archon of Athens, **reforms Athenian constitution.** 560–527. **Pisistratus** tyrant of Athens. 514. Hipparchus, son of Pisistratus, slain by Harmodius and Aristogiton; his brother Hippias expelled, 510. 509. **Reforms of Clisthenes** at Athens.	510 (traditional date). **Kings** (Etruscans?) **expelled from Rome; republic founded.**
500	Frequent **revolts** against Persian rule. 414. Successful revolt re-establishes **Egyptian independence for 60 years.**	458. **Ezra** returns to Jerusalem. 445. **Nehemiah rebuilds Jerusalem.** **Malachi** last of the Old Testament writers.	**486–465. Xerxes.** Great expedition against Greece (480). Internal decay of Persian Empire; frequent revolts of Egypt, etc. 401. Unsuccessful revolt of Cyrus the Younger against his brother, Artaxerxes II; **retreat of Xenophon** and the 10,000 Greeks.	500. Athens aids Greeks of Asia Minor against Persia. 493–492. **Themistocles** archon of Athens. **493–479. Persian Wars.** Darius sends expedition into Thrace and Macedonia (493); attacks Greece (**Marathon**, 490); **Xerxes invades Greece** (**Thermopylae** and **Salamis**, 480; **Plataea**, 479). 478. An **Athenian Empire** founded by Confederacy of Delos, against Persians; **Athens and Sparta at head of rival leagues.** **444–429. AGE OF PERICLES**, height of Athenian culture. (Aeschylus, Sophocles, Euripides, Aristophanes, Herodotus, Thucydides, Phidias, Ictinus, Socrates, Zeno.) Acropolis developed; Parthenon built. **431–404. Peloponnesian Wars** between Athenian and Spartan alliances; Athenian expedition to Syracuse unsuccessful (415-413); Spartans besiege Athens (413-404); Athenian fleet destroyed at Aegospotami (405); **surrender of Athens.**	494. Struggle between **Patricians and Plebeians**; tribunes created. 450. Roman laws made public (12 tables).
400	343. New Persian conquest of Egypt by Artaxerxes III.	Sidon chief city of Phoenicia. 346. Revolt of Sidon suppressed by Artaxerxes III with great cruelty.	362–338. Artaxerxes III King of Persia; poisoned by his Egyptian favorite Bagoas.	399. **Socrates** put to death in Athens. 379–362. War between Sparta and Thebes (**Epaminondas**); Leuctra (371); **leadership passes to Thebans.** 357–355. **Revolt** of Athens' allies **destroys Athenian Empire.** 359–336. **Rise of Macedon to power under Philip** (power of Thebes destroyed at Chaeronea, 338). **Macedonian supremacy in Greece.** **336–323. Alexander the Great.** Invades Asia and founds Greek (Hellenistic) power of far-reaching influence.	396. Romans take **Veii** after 10 years siege; end danger from Etruscans. **390. Gauls plunder Rome** (Battle of the Allia). 367. Licinian laws passed **to equalize Patricians and Plebeians.** 343–341. First war against Samnites (kindred mountain tribes southeast of Rome). 340–338. Revolt of Latins crushed; Latin League dissolved. 326–304. Second Samnite War. Roman army defeated in the **Caudine Forks** and sent "under the yoke" (321). Victories of Romans at Vadimonium Lake (310) and Bovianum (305) end the war. Rome becomes the **dominant power of Italy south of the Rubicon River.**

MACEDONIAN EMPIRE

334. **Alexander attacks Persian Empire** (Battle of the **Granicus**, 334; of **Issus**, 333; of **Arbela**, 331).
332. **Palestine** conquered by Alexander.
332. **Alexander conquers Egypt** from Persia and founds **Alexandria.**
330. Darius III slain while fleeing after Arbela; **end of Persian Empire.**
323–276. **Wars among the successors of Alexander** (Diadochi), who divide the Macedonian Empire.

EGYPT	PALESTINE	SYRIA AND ASSYRIA	GREECE
323-30 B.C. Ptolemies (descendants of one of Alexander's generals) rule Egypt; great library at Alexandria.	323–276. Ptolemies rule Palestine.	312–281. **Seleucus**, son of one of Alexander's generals, **rules from Syria to the Indies** (his descendants called Seleucids)	323–146. Macedonia and Greece under Demetrius Poliorcetes and his descendants. 323–322. Greek states fail in revolt against Macedonians.

B. C.	EGYPT	PALESTINE	SYRIA AND ASSYRIA	GREECE	ROME
300	285–246. Ptolemy II (Philadelphus); brilliant court at Alexandria; Egypt's navy rules eastern Mediterranean.	276. Antiochus of Syria conquers Palestine from Egypt.	250. **Parthians** under Arsaces revolt. 242. **Antiochus the Great** defeated by Romans at **Magnesia** (190); Seleucid rule curtailed in west.	280–183. **Aetolian and Achean Leagues** prevent Macedonia securing complete power in Greece.	282–272. War with Tarentum aided by King **Pyrrhus** of Epirus. **264-241. First War with Carthage** (over Sicily). Rome becomes a naval power, invades Africa and Sicily, and defeats Carthage in numerous battles at sea. **Rome gains Sicily.** **218-202. Second War with Carthage. Hannibal** invades Italy over the Alps; defeats Romans at **Cannae** (216); Scipio carries the war into Africa (204), and defeats Hannibal at **Zama** (202). Carthage becomes a vassal state. 215–206. First Macedonian War.
200	Decline of Egypt; frequent wars of **Ptolemies** with the **Seleucids** of Syria.	167–130 **Maccabees** (kings) rule Palestine as Roman **vassals.**	174–136. **Mithridates I founds Parthian Empire** (Media, Persia, Babylonia, etc.).	197. Macedonians defeated at **Cynoscephalae** by Romans, and **Greece freed from Macedonian rule.** 146. Achean League defeated by Romans and **Corinth destroyed. Greece passes under Roman rule.**	200–197. Second Macedonian War; Greece freed. 190. **Antiochus of Syria overthrown** (western Asia Minor under Roman control). 171–168. Third Macedonian War; **end of Macedonian monarchy.** **149-146. Third War with Carthage;** Carthage destroyed. **146. Macedonia becomes a Roman province.** 133. **Practically all Spain under Roman rule.** 133–123. Tiberius and Caius **Gracchus** attempt to reform the land laws and are slain. 113–101. Cimbri and Teutones (Germanic invaders) defeated by **Marius.**
100	Civil wars among degenerate Ptolemies pave way for fall. 47. **Cleopatra** made ruler of Egypt under Roman supremacy. 31. Cleopatra and Antony defeated at **Actium.** Egypt becomes a **Roman province.**	63. Pompey makes Jews **tributary to Rome.** 40. **Herod** (the Great) recognized by Rome as **dependent king** of Judaea. 4. **Birth of Christ.**	88–64. **Mithridates VI (the Great)** defeated by Romans; **Syria and Armenia submit to Rome.**		90. **Roman citizenship granted to all Latins and most other Italians,** following revolt of Rome's allies ("Social War," 90–88). **88-82. Civil War between Sulla** (wealthy classes) **and Marius** (poorer classes). Reactionary reign of terror under Sulla as dictator. 73–71. Revolt of gladiators and slaves under **Spartacus.** 66–62. **Catiline's conspiracy** (Cicero's speeches). 60. Caesar, Pompey, and Crassus form **first Triumvirate.** **58–51. Caesar conquers Gaul;** two expeditions to **Britain** (55–54 B.C.). 49–48. **Civil war between Caesar and Pompey** (Battle of **Pharsalus;** Pompey slain). Under forms of the republic, Caesar gets all power into his own hands. 44. **Assassination of Caesar** by Brutus, Cassius, and others. 43–42. Mark Antony, Octavian (Augustus), and Lepidus form **second Triumvirate** and defeat Cassius and Brutus at **Philippi.** 31–30. War between Octavian and Antony; Antony and Cleopatra of Egypt defeated at **Actium.** **31 B.C.-14 A.D. Octavian rules as Emperor Augustus. Beginning of ROMAN EMPIRE.** (Golden Age of Roman culture; Livy, Horace, Vergil, Seneca, Pliny the Elder.)
TIME B.C.					
TIME A.D.	Under Roman rule Egypt enjoys a period of industrial and commercial prosperity.	6. **Judaea** becomes part of **Roman province of Syria.** **70. Jerusalem destroyed** by Titus following revolt. Dispersal of survivors.			14–37. **Tiberius** emperor (stepson of Augustus). 37–41. Caligula (great-grandson of Augustus). 41–54. Claudius; **Britain added to Roman Empire.** 54–68. **Nero;** his crimes and excesses; **great fire in Rome; Christians persecuted.** 69–79. **Vespasian** proclaimed emperor by his troops in Syria; good rule. 79–81. **Titus** (son of Vespasian). 79. **Eruption of Vesuvius destroys Pompeii and Herculaneum.** 98–117. **Trajan,** a Spaniard by birth and a great general (conquest of Dacia; defeat of Parthians in Syria; Empire reaches greatest extent).
100	Revolt of native troops begins **decline of Egypt.**	132–135. **Revolt of Jews** suppressed by Hadrian; **survivors dispersed.**	114–116. Armenia, Mesopotamia, and Assyria made **Roman provinces.** 193–211. Northern Assyria conquered by Rome.		117–138. **Hadrian** adopted by Trajan; frontiers strengthened; **Asia east of Euphrates given up;** magnificent buildings. 138–161. **Antoninus Pius.** 167–180. **Marcus Aurelius,** adopted son of Antoninus and a renowned Stoic philosopher. Wars with barbarians along Danube. 193–284. Emperors elected by the army. 193–211. Septimius Severus; war in Mesopotamia; northern Assyria conquered.
200	270. Egypt occupied by Zenobia of Palmyra. 273. Egypt reconquered by Rome.		226–241. **New Persian Empire** under **Sassanids.** 267–273. **Zenobia, queen of Palmyra,** defeated by Aurelian.		212. **All freemen in the Empire made citizens** (to get more taxes). 270–275. **Aurelian;** recovers Palmyra and subdues revolt in Gaul; new walls about Rome. 284–305. **Diocletian** (resides in East); **empire divided** into four administrative prefectures; **great persecution of Christians; abdicates.**
300	Quarrels between branches of the Christian Church lead to **persecution of the Arians.**				**311. Christianity made legal.** 323–337. **Constantine the Great** sole ruler; **capital removed to Constantinople:** empire reorganized. 325. Council of Christian church at **Nicaea.** **375. Beginning of TEUTONIC MIGRATIONS into the Empire.** 378. **Visigoths** defeat Roman army at **Adrianople.** **379–395. Theodosius the Great,** last ruler of united empire. 395. Empire divided into **Eastern** and **Western** parts.
400					**395–476. WESTERN EMPIRE.** 410. **Alaric the Visigoth captures Rome.** 455. **Vandals** from Africa sack Rome. **476. German leader Odoacer deposes last Roman emperor in West.** **395–1453. EASTERN OR BYZANTINE EMPIRE.** For nearly 1,000 years a defense against Asiatic invasions.

	WESTERN EUROPE		ENGLAND	EASTERN EUROPE AND OTHER COUNTRIES
			Romans rule Britain since about 43–81 A.D.; Christianity introduced; **Hadrian's wall** begun (121).	375. Visigoths cross Danube; defeat Romans at Adrianople (378). 395. Death of Theodosius the Great, last ruler of united Roman Empire. **395–1453. EAST ROMAN EMPIRE** (Arcadius emperor, 395–408).
	383–394. Wars for power among claimants of Empire in West ended by recognition of Theodosius (*see* Eastern Europe). 395–423. Honorius receives **Western Roman Empire** on permanent division (Stilicho, his minister).			
400	**410. Sack of Rome** by Visigoths under **Alaric**; Visigoths move into Spain (414). 429. **Vandals** cross from Spain into Africa; under Genseric **plunder Rome.** 451. **Attila** the Hun defeated at Châlons (in Gaul). 476. Odoacer, German mercenary, displaces Roman emperor; **end of Western Roman Empire.** 481–511. **Clovis founds kingdom of Franks** in Gaul (Merovingians); becomes **Christian** (496). 493–555. **Ostrogoths (Theodoric the Great)** rule Italy.		410. Roman legions withdrawn. 449–700. **Angles, Saxons, and Jutes conquer Britain** ("Angleland" or England).	474–491. Zeno eastern emperor.
500	511–751. Decline of Merovingian kings of Franks and **rise of Mayors of Palace.** 568–774. **Lombard** kingdom in Italy. 590–604. **Pope Gregory I (the Great)**; Rome the head of Christendom.		577. Battle of Deorham; West Saxons reach Bristol Channel. **597. Augustine reintroduces Christianity.**	**527–565. Justinian emperor;** Roman law codified; Vandals in Africa and Ostrogoths in Italy overthrown.
600	613. Queen **Brunhilde** of Austrasia (Eastern Frank-land) captured, tortured, and dragged to death by wild horses in Merovingian quarrels. 687. Pepin of Heristal becomes Mayor of Palace for whole Frankish kingdom (Battle of Testry).		607. Chester sacked and left desolate for 300 years.	622. Mohammed's flight from Mecca (the "Hegira"); **founding of Mohammedan religion.**
700	711. Mohammedans from Africa overthrow Visigothic kingdom in Spain. 732. Franks (**Charles Martel**) defeat Mohammedans at **Tours** (in France). 751. Pepin the Short (Mayor of the Palace) deposes last Merovingian king and takes the crown (Carolingian rule).		755–794. Offa king of Mercia.	750. Mohammedans rule all western Asia, northern Africa, and Spain—from Indus River to the Pyrenees.
800	800. **Charlemagne, king of the Franks** and ruler of most of western Europe **(768–814), crowned emperor at Rome.** **843. Partition of Verdun.** Charlemagne's empire divided; separation of **France** and **Germany.**		827. Egbert of Wessex **unites England.**	809. End of brilliant reign of **Harun-al-Raschid, calif of Bagdad.** 862. **Russian kingdom founded by Rurik the Northman** (Kief, capital).
900	**FRANCE** 911. Normandy ceded to Rolf (Rollo), the Northman; decline of Carolingians in France. **987. Hugh Capet chosen king** (Capetian line); **Feudalism** at height of its power.	**GERMANY AND ITALY** 911–918. Conrad I (Franconian) first non-Carolingian king. **936–973. Otto I, the Great** (Saxon), ends anarchy in Italy; defeats Hungarians (955); **revives Empire** (962).	**871–900. Alfred** rules southern England; Danes checked. 910–954. Northern England ("Danelaw") reconquered from Danes. 980. Danish invasions renewed.	905–959. Constantine VII ("Born in the Purple") emperor, patron of literature.
1000	1096. Council of Clermont; Pope Urban II calls First Crusade.	1002–24. Henry II (the Saint), **last of the Saxon line.** 1075. **Investiture conflict begun** by Pope Gregory VII (**Hildebrand**) and Emperor Henry IV (1056–1106).	1016–1035. **Canute** of Denmark king. 1042–66. Edward the Confessor king. **1066. Norman conquest** (William I).	1000. **Northmen discover America** (Greenland discovered, 984).
	PERIOD OF THE CRUSADES—TO RESCUE PALESTINE FROM MOHAMMEDAN RULE—1096-1291			
	1096-99. First Crusade. People's crusade under Peter the Hermit fails. Crusade of nobles under Godfrey of Bouillon and others takes Jerusalem (1099) and establishes a feudal kingdom of Jerusalem.			
1100	1108–37. **Louis VI (the Fat)** establishes order in crown possessions.	1122. Concordat of Worms ends investiture conflict.	1100–35. Henry I ("the Lion of Justice"); a charter issued.	1144. **Edessa** taken by Mohammedans.
	1147-49. Second Crusade. Preached by St. Bernard of Clairvaux; led by Conrad III of Germany and Louis VII of France without results.			
	1180–1223. **Philip Augustus**; recovers **Normandy**, etc., from England.	1152–1190. **Frederick Barbarossa (Hohenstaufen)**; quarrel with pope; defeated by league of Lombard towns.	**1154–89. Henry II (Plantagenet)** holds **Normandy, Anjou, Maine**, etc., in France. Conquest of **Ireland** begun.	1187. Capture of **Jerusalem** by **Saladin.**
	1189-92. Third Crusade. Led by Richard Coeur de Lion of England and Philip Augustus of France; Emperor Frederick Barbarossa drowned on way. Armistice with Saladin permits pilgrimages to Holy Places.			
1200	1209–29. **Albigensian crusade.** 1214. Battle of Bouvines; defeat of English and enemies of Frederick II. **1226–70. Louis IX (St. Louis)**; good rule. **Crusade to Egypt** (1248–54); to **Tunis** (1270). **1285–1314. Philip IV** (the Fair). Power of king increased; quarrels with pope.	1200–1450. **Hanseatic League** between German cities promotes commerce. 1215–50. **Frederick II**; rules Naples and Sicily as well as Empire; quarrels with pope; **Fifth Crusade** (1228–29). 1256–73. **Interregnum in Empire.** 1273–91. **Rudolph of Hapsburg** king of Germany. 1295. Marco Polo returns from 20 years' travels in China and the East.	1204–06. **King John loses Normandy and Anjou**; forced to grant **Magna Carta** (1215). **1272–1307. Edward I**; conquest of **Wales** (1282); wars with **Scotland** begun. 1295. **Model Parliament** called.	**1202–04. Fourth Crusade** directed against **Constantinople** by **Venetians.** 1206–27. **Genghis Khan** conquers China, Persia, Turkestan, and Southern Russia. **1291–1499. Growth of Swiss Confederation** (Battle of Morgarten, 1315; Sempach, 1386). 1297. Fall of Acre; end of Crusades.
1300	1302. First meeting of **Estates-General.** 1302. Battle of **Courtrai**; Flemish townsmen defeat French knights. **1305–77. "Babylonian captivity of Popes"** (papal residence at Avignon, France). 1328. Philip VI (Valois) becomes king. **1339–1453. Hundred Years' War with England** (Peace of Bretigny, 1360; war renewed, 1369). 1364–80. **Charles V (the Wise).** Most of English possessions in France won back by **Du Guesclin.**	**PERIOD OF ITALIAN RENAISSANCE** **1300–1500.** Dante, Petrarch, Boccaccio, Giotto, Michelangelo, Da Vinci, Raphael, Titian. 1347–1437. Emperors of **Luxemburg-Bohemian line.** 1348. **Black Death** appears in Florence and spreads over Europe. 1356. Charles IV issues **Golden Bull.** 1377. Papacy returns from Avignon to one. **1378–1417. Great Schism** (two, later three, claim to be pope). 1380. **Venice crushes Genoa** at Chioggia.	1314. Edward II defeated at **Bannockburn** by Scots under **Bruce.** **1327–77. Edward III.** **1339–1453. Hundred Years' War with France.** English victories at **Crécy** (1346) and **Poitiers** (1356). 1381. **Peasants' revolt** led by John Ball and Wat Tyler. **1399. Henry IV (Lancaster)** overthrows Richard II.	1331–55. Stephen Dushan rules an extended Serbian Empire. 1354. **Ottoman Turks** gain foothold in Europe (Gallipoli). 1389. Serbs defeated by Turks in great battle at **Kossovo.**

	FRANCE	GERMANY	ITALY AND PAPACY	GREAT BRITAIN	OTHER COUNTRIES
1400	1415. Hundred Years' War renewed in reign of Charles VI (insane after 1392). 1429-31. **Joan of Arc saves France.** (War ends in 1453: England loses all its possessions in France except Calais.) 1461-83. **Louis XI** strengthens France. 1477. **Charles the Bold** of Burgundy overthrown; his duchy annexed to France. 1494. **Charles VIII invades Italy** (Italian wars begun).	1410-37. Sigismund emperor. 1419-36. **Hussite Wars.** (Ziska blind leader against Germans.) 1440-93. **Frederick III** (Hapsburg) emperor. 1450. Gutenberg invents printing. 1493-1519. **Maximilian I** emperor.	1414-18. **Council of Constance;** schism ended; **John Huss** burned as heretic (1415). 1469-92. **Lorenzo de Medici** rules Florence. 1494-98. **Savonarola** attempts reform in Florence.	1415. **Henry V** invades France (**Agincourt, 1415**). 1450. Jack Cade's rebellion. 1455-85. **Wars of the Roses** (Houses of **York** and **Lancaster** claim crown). 1485. **Henry VII (Tudor)** defeats Richard III (York) at Bosworth and ends war. Strong monarchy established.	1453. **Turks take Constantinople;** end of Eastern Empire. 1492. **Columbus discovers America.** 1492. Conquest of Granada; Moors expelled from Spain. 1497-98. **Vasco da Gama reaches India by sea.**
1500	1515-47. **Francis I;** wars with Charles V over Milan; Renaissance encouraged in France. 1562. **Huguenot Wars begun** (St. Bartholomew's Massacre, 1572). 1589-1610. **Henry IV** (Bourbon). Edict of Nantes ends Huguenot wars (1598).	1517. Luther begins **Protestant Reformation; Diet of Worms** condemns Luther (1521). 1519-56. **Charles V rules Spain, Germany, Netherlands, parts of Italy and America.** Opposes Luther; wars against Turks (1526-32); abdicates (1555-56). 1555. **Religious peace of Augsburg** (toleration of Lutherans). 1556-64. Ferdinand I. 1563. **Council of Trent ends** (beginning of Catholic recovery).	1503-13. **Pope Julius II** (Italian wars; patron of Michelangelo and Raphael). 1508. League of Cambrai (Pope, Austria, France, and Spain) against Venice. 1513-21. **Pope Leo X** (Medici) patron of arts and letters. 1542. Pope Paul III establishes the Inquisition in Rome. 1571. League of Papacy, Spain and Venice against Turks (**Battle of Lepanto,** 1572).	1509-47. **Henry VIII; separation of English Church from Rome.** 1547-53. Edward VI. 1553-58. **Queen Mary** restores Catholic Church. 1558-1603. **Elizabeth establishes Church of England.** Growth of sea power; industrial development. Elizabethan period of literature (**Shakespeare**). 1558. **Spanish Armada** destroyed.	1518. **Zwingli** begins Reformation in Switzerland. 1536. **Calvin** begins Reformation at Geneva. 1540. **Jesuit order** founded by Loyola. 1556-98. **Philip II** succeeds his father Charles V in Spain, Italy, Netherlands, and the New World. 1568. **Revolt of Netherlands** against Spain; siege of Leyden (1574); Union of Utrecht (1579); declaration of independence by the Dutch (1581).
1600	1610-43. Louis XIII; political power of the Huguenots crushed. (**Richelieu** chief minister of the crown.) 1643-1715. **Louis XIV;** numerous wars of conquest; extravagant court at **Versailles;** brilliant period of French literature. 1685. Edict of Nantes revoked and toleration of Huguenots ended.	1618-48. **Thirty Years' War.** Imperialist (Catholic) generals, **Tilly** and **Wallenstein; Gustavus Adolphus,** Protestant king of Sweden, victorious at **Leipzig** (1631); **Lützen** (1632); **Peace of Westphalia** (1648). 1640-88. **Growth of Prussia** under the **Great Elector.** 1683. **Vienna besieged for last time by Turks;** rescued by **King John Sobieski of Poland.**	1629. War over Mantua between Spain (which possessed Milan) and Austria. 1684. Venice joins Austria and Poland in attack on Turks; makes conquests in Morea.	1603-25. **James I** (Stuart); personal union of England and Scotland. 1607. Virginia colony founded (Jamestown). 1620. Plymouth colony settled (Boston, 1630) by Puritans fleeing persecution in England. 1642-49. **Civil war** between Crown and Parliament; Marston Moor (1644); Naseby (1645). Charles I executed (1649). England a commonwealth. 1653-59. **Cromwell** rules England, Scotland, and Ireland as Lord Protector. 1660. **Stuart restoration** under Charles II. 1688. **"Glorious Revolution"** expels James II and seats William and Mary; Protestant succession established.	1611-32. **Gustavus Adolphus** king of Sweden. 1644. Manchu rule begins in China. 1648. Spain recognizes independence of the Dutch Netherlands. 1672-1715. **Peter the Great;** introduction of western culture in Russia; St. Petersburg founded (1703). 1697-1718. **Charles XII of Sweden.**
1700	1701-13. **War of the Spanish Succession.** Treaty of Utrecht seats French prince (Philip V) on Spanish throne. 1715-74. **Louis XV;** debauchery at court; France aids Prussia in Austrian Succession War. 1756-63. **Seven Years' War;** France aids Austria against Prussia, loses Canada and India to British. 1774-92. **Louis XVI** (Marie Antoinette of Austria, queen); reform measures defeated. 1789-95. **French Revolution.** Estates-General becomes National Assembly (1789); constitution accepted by king (1791); kingship abolished (1792); **Louis XVI executed** (1793); **Reign of Terror** (1793-94); **Directory** established (1795). 1796-99. Rise of **Napoleon Bonaparte** to be First Consul.	1701. Elector of Brandenburg receives title of **King of Prussia.** 1701-13. Austria takes part in **War of Spanish Succession.** 1713-40. Frederick William I develops Prussian army. 1740-80. **Maria Theresa** queen of Bohemia and Hungary, archduchess of Austria; **War of Austrian Succession** (1740-48). 1740-86. **Frederick II (The Great)** seizes Silesia from Austria and retains it in **Seven Years' War** (Battles of **Rossbach** and **Leuthen,** 1757); builds up Prussia in peace time. 1765-90. **Joseph II** emperor; attempts reforms in Hapsburg lands. 1790-92. Leopold II emperor.	1714. Milan, Naples, etc., given to Austria by treaty. 1715. Turks drive Venetians from the Morea and Crete. 1735. Spanish Bourbons established in Naples. 1738. Tuscany given to Francis of Lorraine (husband of Maria Theresa). 1796. **Napoleon** invades Italy; siege of Mantua. 1797. Cisalpine Republic set up by Bonaparte.	1701-13. England takes part in War of Spanish Succession (**Blenheim,** 1704). 1702-14. Anne queen. 1714. **George I (Hanover) becomes king;** growth of cabinet government. 1741-48. England aids Austria in Austrian Succession War. 1745. Jacobite rebellion (Stuart supporters). 1756-63. **Seven Years' War; England aids Prussia; Canada acquired;** supremacy established **in India; British Empire founded.** 1764. **Industrial Revolution begun;** Hargreaves invents spinning jenny. 1775-83. **Revolt of the American colonies.** 1788. British colonization of **Australia** begun.	1709. Battle of Pultowa: forces of Charles XII crushed by Russia. 1763-96. **Catherine II** empress of Russia. 1772-95. **Poland partitioned** among Russia, Prussia, and Austria.

WARS OF THE FRENCH REVOLUTION AND BONAPARTE—1792-1815

1796. **Bonaparte's Italian Campaign.**
1798. Egyptian expedition fails (Battle of the Nile).
1800. Napoleon's victory at Marengo.
1805. Nelson victorious at **Trafalgar.**
1805. Bonaparte wins at **Austerlitz.**
1806. Prussia crushed at **Jena.**
1807. Napoleon defeats Austrians at **Wagram** and Russians at **Friedland.**
1807. **Peace of Tilsit;** hard terms for Prussia. Alexander I of Russia becomes Napoleon's ally.
1812. **Napoleon invades Russia;** sack of Moscow; retreats with heavy losses.
1813. Napoleon defeated in three-day battle at **Leipzig.**
1815. Wellington victorious at **Waterloo.**
1815. Treaty of Vienna.

1800

FRANCE

1804. **Napoleon made emperor.**
1814. **Napoleon** abdicates; returns from Elba (1815); **exiled (1815).**
1814. **Bourbons restored** under Louis XVIII.
1824–30. **Charles X;** reactionary policy.
1830. French begin occupation of Algeria.
1830. July Revolution; Charles X abdicates; **Louis Philippe becomes king** ("citizen king").
1840–48. Guizot ministry, conservative.
1848. February Revolution; Louis Philippe abdicates; republic proclaimed.
1848–52. **Second Republic** (Louis Napoleon, president).
1851. Coup d'etat of Louis Napoleon; proclaimed emperor (**Napoleon III,** 1852–70).
1854–56. **Crimean War.**
1859. **War with Austria** in behalf of Italy.
1861–67. Attempt to found a monarchy in Mexico fails (Maximilian).
1870–71. Franco-Prussian War; France loses **Alsace-Lorraine.**
1870. Third French Republic proclaimed.
1875. Republican Constitution adopted.
1881. Tunis occupied; complications with Italy, Spain, and England.
1891. Dual Alliance of France and Russia announced.
1894–1906. Trials of Dreyfus for treason center of political scandal.
1896. Annexation of Madagascar.

GERMANY

1806. **Confederation of the Rhine formed** by Napoleon.
1806. Holy Roman Empire dissolved.
1819. **Carlsbad decrees** passed by German Diet suppress liberalism.
1833. German Customs Union (**Zollverein**) formed.
1840–61. **Frederick William IV** king of Prussia.
1848. Liberal uprisings in Prussia and other German states.
1848–49. **Frankfort Parliament** to unite Germany fails.
1861–88. **William I** king of Prussia.
1862. **Bismarck** becomes chief minister.
1864. **Schleswig** and **Holstein** seized by Prussia and Austria.
1866. **Austro-Prussian War.**
1867–71. **North German Confederation** under Prussian leadership.
1870–71. Franco-Prussian War; siege of **Metz** and battle of **Sedan** (1870); capture of **Paris** (1871).
1871. German Empire proclaimed; **William I** emperor; Bismarck chancellor (1871–90).
1882. Germany enters **Triple Alliance.**
1884. Germany begins African colonization.
1888–1918. **William II** emperor.

1897. Germany seizes Kiaochow.
1899. Germany obtains Bagdad railway concession from Turkey; other powers refuse to participate in work; Great Britain begins obstructions. Growth of Turko-German friendship.

AUSTRIA-HUNGARY

1806. Holy Roman Empire dissolved; Francis II becomes Francis I of Austria.
1809. **Metternich** becomes minister of foreign affairs; reactionary leader of Europe (1815–48).
1815. Congress of Vienna; treaty of, Vienna signed; **"Holy Alliance"** formed by Russia, Prussia, and Austria.
1835–48. Ferdinand I; reactionary rule.
1848. Revolution expels Metternich; liberal gains short-lived. **Francis Joseph I** begins long reign.
1849. **Hungarian** war for **independence** fails (**Kossuth**).
1859. War with **France** and **Italy** (Battles of **Magenta** and **Solferino**). Austria loses Lombardy.
1866. **War** with **Prussia** (**Sadowa**). Austria withdraws from German Confederation and loses Venetia.
1867. Dual Monarchy of **Austria-Hungary** established.
1876–90. Count Tisza, liberal leader, pursues policy of "Magyarization" in Hungary; economic development.
1882. Triple Alliance formed by Austria, Germany, and Italy.

ITALY

1815. Italy a group of small states under Austrian domination.
1820. **Revolt in Naples** put down.
1821. **Revolt in Sardinia-Piedmont** fails.
1830. Revolution in Italy **suppressed** by Austria.
1848. Revolution headed by Sardinia-Piedmont **crushed** by Austria.
1849. **Victor Emmanuel II** becomes king of Sardinia-Piedmont. **Cavour** premier (1852–61).
1859. War with Austria; Austrian control in Italy broken.
1860. **Garibaldi** conquers Naples.
1860–61. Italy (except Rome) **united** under Victor Emmanuel; kingdom of Italy proclaimed (1861).
1870. Rome taken from pope and made **capital** of Italian kingdom.
1878–1900. **Humbert I** (assassinated by anarchist).
1882. Italy enters **Triple Alliance** with Austria and Germany.
1896. War with Abyssinia; fall of Crispi as prime minister.

1900

1904. **Entente Cordiale** between France and Great Britain settles disputes over colonies.
1905. **Separation of Church** and **State.**
1905–06. Extension of French influence in **Morocco** challenged by Germany; **Algeciras Conference** upholds French policy.
1911. Germany's attempt to protect its nationals during native uprising in Morocco reopens **Moroccan question.** Moroccan and Congo Conventions guarantee economic opportunities to Germany and Protectorate to France; part of French Equatorial Africa given to Germany.

1900. Great **naval development** begins.
1905–06. **First Moroccan Incident.**
1908. Germany upholds Austria in **Bosnia affair.**
1911. **Second Moroccan incident.**
1911. **Enormous development** of Germany shown by: increase of population from 24 to 65 million since 1871; growth of foreign trade from 1,500 to 4,450 million dollars since 1875.
1911–13. German standing army increased from 515,000 to 866,000 men.
1912. Socialists elect 110 of 397 members of Reichstag.

1905–13. Struggle in Hungary over electoral reform; **Magyars** retain political control.
1907–12. Reform measures in Austria blocked by **racial quarrels.**
1908. Austria annexes **Bosnia** and **Herzegovina;** blow to Serbian nationalist movement.

1914. Archduke Francis Ferdinand, heir to Austrian throne, **assassinated** in Bosnia by subjects of Serbian blood.

1900. **Victor Emmanuel III** becomes king.

1911–12. War with Turkey; Italy takes **Tripoli** from Turkey.
1912. **Universal suffrage** introduced.

WORLD WAR

1914. Aug. 1. **Germany declares war** on Russia and World War begins.
1914. Sept. 6–10. **Battle of Marne** halts German invasion of France and Belgium.
1915. **Gallipoli expedition** fails.
1915. **Italy and Bulgaria** enter the war.
1916. Germans fail to take **Verdun;** first **battle of** the **Somme.**
1917. Apr. 6. United States enters the war.

1919. Treaty of Versailles ratified. By this and subsequent peace treaties France obtains **Alsace-Lorraine,** parts of **Cameroon** and **Togo** (in Africa), mandate over **Syria,** etc., also economic reparations.

1920. Caillaux's trial for treason concluded, a feature in political life.
1920. **Clemenceau** resigns as premier. M. Millerand appointed successor.
1920. French troops occupy **Frankfort** but withdraw upon protest of British government.
1920. Chamber of Deputies votes to resume diplomatic relations with Vatican.
1920. Millerand elected president.
1921. Briand appointed premier and minister of foreign affairs.

1918. **German revolution; William II abdicates.**
1919. June 28. **Treaty of Versailles** signed (ratified July 10); Germany loses overseas colonies; **Alsace-Lorraine,** parts of **Posen** and **West Prussia,** etc., armament reduced; reparations provided for.
1919. **"Spartacan"** (extreme Socialist) **revolt** suppressed.
1919. **Republican constitution** adopted.
1920. **Upper Schleswig** votes for union with Denmark.
1920. Kapp counter-revolution fails.
1920. German delegates admitted to meeting of Supreme Council at Spa.
1921. **Upper Silesia** plebiscite returns majority for German union.
1921. Amount of **reparations** fixed at 132 billion gold marks.

1916. **Charles I** succeeds Francis Joseph.
1918. Oct. 21. Independence of **Czecho-Slovakia** proclaimed.
1918. Nov. 3. Austria signs **armistice.**
1918. Oct. 31. **Hungary** declares itself an independent **republic.**
1918. Nov. 12. **Republic of Austria** proclaimed; Charles I abdicates.

CZECHO-SLOVAKIA

1920. **Constitution** adopted.
1920. Joins Jugo-Slavia and Rumania in **Little Entente** against Hungary.

HUNGARY

1919. Mar.-Aug. Soviet régime overthrown with Rumanian aid.
1920. **Treaty of Trianon;** Hungary loses territory to Czecho-Slovakia, Italy, etc.
1921. Attempt of Charles I to regain throne fails; Charles exiled to Madeira.

AUSTRIA

1919. **Treaty of St. Germain** reduces Austria to small area about Vienna.
1920. **Klagenfurt region** votes for union with Austria.
1921. Various districts vote for union with Germany.

1919. **Treaty of St. Germain;** Italy gains **Trentino,** etc.
1919–20. **D'Annunzio** holds **Fiume.**

1920. **Treaty of Rapallo** with Jugo-Slavia secures **Istria** and **Gorizia; Fiume** free state.

1921. Struggle between Fascisti and communists for political control.

GREAT BRITAIN	RUSSIA	TURKEY AND THE BALKANS	OTHER COUNTRIES AND GENERAL PROGRESS
1801. **Irish Parliament abolished;** Irish members seated in British Parliament. **United Kingdom** of Great Britain and Ireland. 1806. **Cape Colony** conquered; beginning of British in South Africa. 1807. **Abolition of slave trade** in British Dominions. 1812–14. **War with the United States;** Treaty of Ghent (1814). 1820–30. **George IV** king. 1827. English fleet participates in battle of **Navarino Bay** against Turks. 1830–37. **William IV** king. **1832. Reform Bill;** political power to middle classes. Other legislation abolishing slavery, reforming labor conditions, etc. **1837. Victoria** begins her long reign. 1846. Repeal of corn laws; **free trade** established. **1854–56. Crimean War** with Russia in defense of Turkey. 1857. **Indian Mutiny; British government assumes rule of India (1858).** 1867. Second parliamentary reform act; **political power** extended to **workingmen;** beginning of **democratic rule.** 1868–74. First ministry of **Gladstone** (Liberal); "Great Ministry." 1870. Beginning of **Home Rule** agitation. 1874–80. **Disraeli** ministry (Conservative). 1882. British occupy **Egypt.** 1887. First Colonial Conference. 1899–1902. **Boer War. Union of South Africa** formed (**1909**).	1801–25. **Alexander I** emperor. 1809. **Finland** ceded to Russia following war with Sweden (1807–09). 1815. Czar grants a constitution to Poland. 1825–55. **Nicholas I** emperor. 1828–29. Russia wages **war against Turkey** in behalf of Greece. 1830–32. Revolution in Poland fails; **Poland** made a **Russian province.** 1854–56. **Crimean War;** western powers against Russia (siege of **Sebastopol,** 1854–55). Peace of Paris formulates rules for naval warfare (1856). 1855–81. **Alexander II** emperor. 1861. Czar **frees Russian serfs.** 1863. **Polish insurrection** suppressed vigorously. **1877–78. Russo-Turkish War.** 1881. Alexander II assassinated. 1881–94. **Alexander III** pursues strong **reactionary** policy. Persecution of Jews begins. **1891. Dual Alliance** formed. 1894–1917. **Nicholas II** exercises **absolutism;** suppression of intellectual progress. 1899. Finnish constitution abrogated.	1821–29. **War for Greek Independence** (Philhellenic movement; Lord Byron). Greece gains independence (1829). 1828–29. **Russo-Turkish War** (Treaty of **Adrianople;** Greek Independence acknowledged; **Moldavia** and **Wallachia** partially independent). 1830. **Serbia** secures **autonomy** after long struggle (revolts of 1804, 1820). 1833–62. **Otto I** (House of Bavaria) king of Greece. **1854–56. Crimean War.** Western Powers aid Turkey against Russia. 1866. **Rumania formed** as self-governing state by union of Moldavia and Wallachia (Charles I, 1866–1914). **1877–78. Russo-Turkish War** (siege of **Plevna,** 1877). **Treaties of San Stefano** and **Berlin** make Serbia, Montenegro, and Rumania independent; Bulgaria partly autonomous.	Application of steam power, by James Watt, to spinning and weaving industries leads to **industrial revolution.** 19th century opens new era. 1807. **Steamboat** service established by **Fulton.** 1812. **Uprising in Spain** against **Napoleon** and adoption of Liberal Constitution. **Liberalism** later **suppressed** by Ferdinand VII (1814–33). **1820. Revolutions** in Italy and Spain crushed by European Alliance (1821–23). 1830. **Revolutionary movements** in **Italy, Poland,** and **Belgium.** Independent **monarchy** established in **Belgium (Leopold I,** 1833–65). **1830.** Manchester and Liverpool **railroad opened;** Baltimore and Ohio railroad begun. 1837. Patent granted to S. F. B. **Morse** for electro-magnetic **telegraph.** 1840. British **"opium war"; China opened** to foreigners. 1854. **Japanese ports opened** to foreigners. 1858. **Trans-Atlantic** telegraph **cable** laid (permanent from 1866). 1859. Publication of Charles **Darwin's** 'Origin of Species' setting forth doctrine of evolution. 1864. Geneva Convention; beginning of **International Red Cross.** 1869. **Suez Canal** opened. 1883. Congo Free State formed, Leopold I of Belgium king; made Belgian colony (1908). **1884. Partition of Africa** among European powers. 1894–95. War between China and Japan. **Expansion of Japan** begins. **1899. First Hague Peace Conference.** Establishment of Court of International Arbitration. 1899. **Wireless telegraphy** established between France and England by **Marconi** (Italian).
1901. Queen Victoria dies. 1901–1910. **Edward VII** king. 1901. **Commonwealth of Australia** formed. 1903. Irish land purchase act passed. 1907. **Anglo-Russian Agreement** settles differences over **Persia.** 1908–1916. **Herbert Asquith** prime minister (Liberal). 1910. **George V** king. 1911. **Power of House of Lords limited.** 1914. **Irish Home Rule Bill** passed and suspended. 1914. Bill passed for **disestablishing Anglican Church of Wales;** suspended.	1902. **Trans-Siberian railroad** opened. **1904–05. Russo-Japanese War.** **1905. Russian revolution** begins; first **Duma** meets (1906). 1907. **Anglo-Russian agreement** made.	1908–09. Successful **revolution in Turkey** by **"Young Turks."** 1911–12. **Turco-Italian War.** 1912–13. **Balkan Wars;** Balkan allies conquer most of Turkey in Europe; fight over new boundaries.	1900. European Powers intervene in **Boxer Uprising** against foreigners in China. 1903. First successful demonstration of **airplane** by Wright brothers at Kitty Hawk, N. C. 1905. **Union of Sweden and Norway dissolved.** 1907. Nineteen women elected to Finnish Diet, **first women** members in a **national legislature.** **1907. Second Peace Conference** at The Hague. 1909. Commander **Peary** reaches **North Pole.** 1910. **Revolution in Portugal; republic** established. 1911–12. **Revolution** in **China; republic** proclaimed. 1911. Capt. Roald **Amundsen** reaches **South Pole.** 1914. **Panama Canal opened** to traffic by U. S.

OF 1914–1918

1917. **Jerusalem captured** by the British.
1918. **Russia** (Mar. 3) and **Rumania** (May 6) sign **peace** with Central Powers.
1918. Mar. 21–July 18. **German drive** in the West **fails.**
1918. July 18–Nov. 11. **Allied counter-offensive successful; Hindenburg line smashed.**
1918. **Armistices** signed by **Bulgaria** (Sept. 30), **Turkey** (Oct. 30), **Austria** (Nov. 3), **Germany** (Nov. 11).

	POLAND			
1916. **Sinn Fein revolt** in Ireland crushed; **Sir Roger Casement** executed. 1916. **Lloyd George** becomes premier (Coalition Cabinet). 1918. **Suffrage** extended to **women.** 1918. Labor party secures 75 seats in Parliament at general elections. 1919. **Anglo-Persian agreement** puts Persia under British influence. 1919. **Irish declare independence;** movement for republic checked by military measures; rioting and disorder follow. 1919. By the **Treaty of Versailles** and subsequent agreements Great Britain obtains **mandates** over much former German territory in **South Africa, Palestine, Mesopotamia,** etc. 1920. New Home Rule Bill passed. 1920. Labor unrest leads to adoption of liberal government labor program. 1921. King opens the **Ulster Parliament** under Home Rule Bill. 1921. Truce between Sinn Feiners and government; treaty negotiated giving Ireland dominion status in British Empire.	1917. **Poles** organize army and **join Allies.** 1918. **Republic of Poland proclaimed.** 1919. **Treaty of Versailles** recognizes Polish independence and restores German, Austrian, and part of Russian Poland. 1920. **Treaty** of peace with Russia. 1921. **Constitution** adopted. 1921. Plebiscite in **Upper Silesia** gives Germany largest vote, but Poland important districts; disorder follows.	**1917.** Mar. 15. **Revolution; Nicholas II abdicates; Kerensky** becomes dictator. **Republic proclaimed,** Sept. 17. 1917. Nov. **Bolshevik** government succeeds Kerensky régime. 1918. Mar. 3. **Peace of Brest-Litovsk** signed with Germany. 1917–18. Several Russian provinces establish independence: **Finland, Ukraine, Esthonia, Lithuania, Latvia.** 1919–20. Anti-Bolshevik leaders overthrown; influence extended into Asia Minor. 1920. **Russo-Polish treaty.** Russia retains White Russia.	1917. **Greece joins Allies** following abdication of Constantine I. 1918. Kingdom of Serbs, Croats, and Slovenes (**Jugo-Slavia**) **proclaimed.** 1919–20. **Greece** obtains **Thrace, Smyrna,** etc., by **treaties** of **Neuilly** and **Sèvres.** 1920. **Turkey** loses half her population and two-thirds of her territory by **Treaty of Sèvres; Smyrna** to Greece, **Adana** to Italy, **Syria** a French mandatary, **Palestine** and **Mesopotamia** British mandataries, **Armenia** independent republic, Straits internationalized. 1920. Alexander dies; **Constantine recalled** to Greece by popular vote. 1921. War between Greeks and Turkish Nationalists in Asia Minor; Greece rejects Allied offers of settlement and demand to return Smyrna to Turkey.	1919. International labor conference in Washington. 1920. **Rumania** obtains **Bessarabia** by treaty with Great Powers. 1920. **Armenia overrun** by Bolsheviki and Turks. President Wilson appoints a mediator. **1920. League of Nations established;** first meeting of Council in Paris, Jan. 16; Assembly meets in Geneva, Nov. 15. 1920. **Danzig** and **Saar Valley** put under administration of League of Nations. 1921. Turkish Nationalists occupy Teheran. **1921. Limitation of Armament Conference** at Washington.

PRELIMINARY EVENTS

1914

June 28. Archduke Ferdinand assassinated.
July 23. Austria sends ultimatum to Serbia; conciliatory reply (July 25).
July 27. Failure of conference proposed by England owing to refusal of Germany.
July 28. Austria declares war on Serbia.
July 29. Russia mobilizes against Austria in aid of Serbia.
July 30. Belgrade bombarded. General mobilization in Russia begun.
Aug. 1. Germany declares war on Russia over mobilization.
Aug. 2. Germany demands passage through Belgium.
Aug. 3. Germany declares war against France, Russia's ally.
Aug. 4. Germans invade Belgium when passage is refused.
Aug. 4. England declares war on Germany to protect Belgium.

	WESTERN FRONT	EASTERN FRONT	OTHER FRONTS AND EVENTS	DIPLOMATIC EVENTS
	Sept. 6-10. German invasion of France stopped at the Marne. Entrenched line established along the Aisne, north to Belgian coast, and southeast to Switzerland. Oct.-Nov. Germans fail to break line in **Flanders** (Ypres).	Aug. 26-31. Hindenburg stops Russian offensive at **Mazurian Lakes** (Battle of Tannenberg). Aug.-May, 1915. Russians invade **Galicia** and capture Carpathian passes. Nov.-Dec. Three German attacks on **Warsaw** beaten off.	Aug. 24. Naval battle at Helgoland; **German navy bottled up.** Aug.-Sept. Germany loses oversea colonies—in Africa to the British, Pacific Islands to British and Japanese. Aug.-Sept. Austrian invasions of **Serbia** fail. Nov. 6. **Japanese take Tsingtau (Kiaochow)** in Shantung, China, from Germans. Nov. 10. German cruiser **Emden** destroyed at Cocos Islands.	Aug. 7. **Montenegro** joins the Allies. Aug. 23. **Japan** joins the Allies. Oct. 29. **Turkey** openly joins Germany and Austria.
1915	Repeated attempts to break the line by Allies at **Neuve-Chapelle** (Mar. 10); Germans at **Ypres** (Apr.-May); Allies above **Arras** (May-June); Germans in the **Argonne** (July); Allies in **Champagne** and **Artois** (Sept.-Oct.).	May-Sept. **"Mackensen's drive"** expels Russians from Galicia. June-Oct. **Austro-German drive into Russian Poland;** capture of **Warsaw** (Aug. 5); Brest-Litovsk (Aug. 25); Vilna (Sept. 18).	Feb.-Dec. Anglo-French attacks on the **Dardanelles** fail. May 7. **Lusitania** sunk; 1,198 lives lost. July. German Southwest Africa conquered by General Botha. Oct.-Dec. **Austro-German army conquers Serbia;** Allied expedition from Saloniki defeated at Vardar (Dec. 3-12). Dec.-Jan. **Gallipoli** expedition abandoned by Allies after enormous losses.	May. 23. **Italy declares war** on Austria. Oct. 13. **Bulgaria** joins Teutonic allies.
1916	Feb.-July. **Terrific German attacks on Verdun fail** ("They shall not pass"). July-Nov. Allied gains in **Battle of the Somme.**	June-Aug. Russian counter-attack on **Galicia**; penetrates to Halicz. Aug.-Dec. **Rumania invades Transylvania;** terrific **counter-attack** of German-Austrian-Bulgarian armies (Mackensen); **Bucharest taken and Rumania crushed.**	Jan.-Feb. Austro-Bulgarian invasion of **Montenegro** and **Albania.** Jan.-July. Russian drive through the **Caucasus.** Apr. 25-28. Sinn Fein rebellion in Ireland crushed; Sir Roger Casement executed. Apr. 29. Capture of British forces at **Kut-el-Amara.** May-June. **Austrian offensive against Italy.** May 31. **Naval battle of Jutland;** German fleet withdraws. Aug. 4. **Italian counter-offensive** begun; gains in the Trentino; **Gorizia** captured (Aug. 9).	Mar. 9. **Portugal** joins the Allies. Aug. 27. **Rumania** joins the Allies. Dec. 7. Lloyd George displaces Asquith as head of British Cabinet.
1917	Mar. **Withdrawal of Germans to "Hindenburg line";** wasting of country on 50-mile front. Apr.-Dec. Repeated **Allied attempts to break line** at **Arras** (Apr.-June); **Vimy Ridge** taken (Apr. 9-12); along **Aisne** (Apr.-Nov.); in **Flanders** (July-Dec.); at **Cambrai** (Nov.-Dec.).	Mar. 15. **Russian revolution** destroys effectiveness of Russian army. July. Russian offensive on east front fails. Sept. 3. **Riga** captured by Germans.	Feb.-Oct. British Mesopotamia campaign; **Kut-el-Amara recaptured** (Feb. 24); **Bagdad** (Mar. 10). Oct.-Dec. **Italian disaster at Caporetto;** driven back from Isonzo to Piave. Oct.-Dec. Allenby's Palestine campaign; **fall of Jerusalem** (Dec. 10).	Jan. 31. **Germany announces unrestricted submarine warfare.** Feb. 3. **United States** severs diplomatic relations with Germany. Mar. 15. **Czar of Russia dethroned;** Kerensky establishes moderate government. **Apr. 6. United States enters the war;** Panama, Cuba, Liberia, Brazil follow; nine Central and South American states sever relations with Germany but do not declare war June 12. King Constantine deposed and **Greece joins Allies.** Aug. 14. **China** joins the Allies. Nov. 8. **Bolsheviki** control government in Russia.
1918	**Mar.-July. Great drive of Germans fails:** Picardy offensive launched (Mar. 21); Lys River (Apr. 9); Aisne and Marne (May 27); Oise (June 9); second battle of the Marne (July 15). **July 18. Allied counter-offensive begun:** Second battle of the Somme (Aug. 8); Americans take **St. Mihiel** (Sept. 12); Germans lose Lys salient (Aug.-Sept.); **Allied and American advance along Argonne-Meuse front** (Sept.-Nov.); **"Hindenburg line" broken** (Oct.); German right flank turned in Belgium (Sept.-Nov.); and line of retreat threatened. **Germans decide to surrender to avoid crushing defeat.**	Feb.-Mar. **Germany transports forces from Russian front** for use on western front. Sept. Allies defeat Bulgarian armies in Macedonia, and **Bulgaria sues for peace.** Oct.-Nov. **Montenegro and Serbia** recovered by Allies.	Aug. 4. Allies seize **Archangel,** Russia, and establish a northern front. Aug. American-Japanese expedition to **Siberia.** Sept. 19-Oct. 26. Allenby clears **Palestine** of Turks; cuts Bagdad railroad. **Turkey sues for peace.** Oct. 24-25. **New Italian attack drives Austrians back** on line from Alps to Adriatic. **Austria sues for peace** (Oct. 29). Nov. 14. Surrender of **German East Africa.**	Jan. 5. Lloyd George announces war aims of the Allies. Jan. 8. **President Wilson lays down "14 points."** Jan.-Feb. Breakup of Russia; Finland, Lithuania, Ukraine, Crimea, Armenia, Siberia, etc., set up independent governments. Mar. 3. **Soviet Russia concludes humiliating peace of Brest-Litovsk with Germany.** June 30-Sept. Allies recognize independence of **Czecho-Slovakia.** Sept. 30. **Bulgaria signs armistice.** Oct. 5. Germany appeals to President Wilson for restoration of peace. Oct. 30. Turkey signs armistice. Oct. 31. Hungarian independence declared. Nov. 3. **Austria signs armistice.** Nov. 9. Polish republic announced. Nov. 10. German Emperor flees to Holland; signs abdication (Nov. 28). Nov. 11. **Armistice signed by Germany.** Nov. 12. **Emperor Charles abdicates** Austrian throne. Nov. Jugo-Slav convention proclaims Unitary Kingdom of Serbs, Croats, and Slovenes.

THE PEACE SETTLEMENT

1919

Jan. 18. **Peace Conference** of 27 Allied and Associated Powers **meets at Versailles.** Treaties drawn up with five enemy nations.

June 28. **Treaty with Germany** signed at **Versailles;** includes **Covenant of the League of Nations.** Germany loses her overseas colonies, Alsace-Lorraine, parts of Posen and West Prussia, and lesser European territories; armament reduced; reparations settlement undertaken. Ratified by all the Powers except the United States, whose Senate rejects the treaty on Nov. 19, 1919, and Mar. 19, 1920.

Sept. 10. **Treaty with Austria** signed at **St. Germain.** Austria reduced from 115,000 to 6,000 square miles, and from 30,000,000 to 6,000,000 population, by territorial cessions to Czecho-Slovakia, Hungary, Poland, Rumania, Serbia, and Italy.

Nov. 27. **Treaty with Bulgaria** signed at **Neuilly.** Bulgaria loses her conquests of the Balkan Wars of 1912-13 and of the World War to Rumania, Serbia, and Greece.

1920

June 4. **Treaty with Hungary** signed at **Trianon.** Hungarian boundaries established with territorial concessions to Rumania, Jugo-Slavia, and other border states.

Aug. 10. **Treaty with Turkey** signed at **Sèvres.** Turkey loses half her population and two-thirds of her territory; the Straits internationalized; much of Asiatic Turkey distributed among the Powers as mandataries; Armenia made an independent nation.

PERIOD OF DISCOVERY—1000-1500

1000. **Northmen discover America.** 1497. **John Cabot discovers Newfoundland.**

FRENCH RULE

1500

1534. **Cartier** coasts along Newfoundland; **explores the St. Lawrence** (1535, 1540).

1600

1604. **Port Royal** (Annapolis, Nova Scotia), first permanent French settlement, founded.
1608. Quebec settled by French colonists led by **Champlain.**
1610. **Hudson discovers Hudson Bay** while searching for the Northwest Passage; England claims Hudson Bay region.
1613. **English colonists** from Virginia **capture Port Royal; Quebec** captured by the British (1629); New France and Acadia restored to the French by the treaty of St. Germain (1632).
1615. **Champlain explores Lake Huron.**
1623-32. War between English and French. English attack Acadia (Nova Scotia); capture Quebec. Canada restored to France by treaty.
1627. St. Lawrence valley granted to Richelieu's company of **"One Hundred Associates"**; control New France (1627-63).
1642. Montreal founded by Maisonneuve as a religious colony.
1658-60. **Groseilliers** and **Radisson** reach the Mississippi and Great Plains.
1663. Charter of the company of "One Hundred Associates" revoked; **New France a royal colony.**
1666. **Allouez** founds a mission on Lake Superior.
1670. Hudson's Bay Company founded in England to carry on trade in the new territory.
1672. **Frontenac** becomes governor of Canada.
1673. Marquette and Joliet discover the Mississippi.
1682. La Salle descends the Mississippi and takes the country for France.
1689-97. "King William's War"; Acadia captured by the British; attack on Quebec fails; conquest restored at the Peace of Ryswick (1697).

1700

1701. **Detroit** founded as French post; **Forts Frontenac** and **Duquesne,** and other posts on the British frontier follow.
1701-13. "Queen Anne's War." Unsuccessful attack on Quebec; **Acadia seized; France cedes Hudson Bay region, Newfoundland, and Acadia to Great Britain** (Treaty of Utrecht, 1713).
1743. The **Verendryans** reach the foothills of the Rocky Mountains.
1744-48. "King George's War." Louisburg captured by English colonists (1745); restored to French by treaty of Aix-la-Chapelle.
1749. English settlement of **Halifax founded;** colonization of Nova Scotia begins.
1755-63. "French and Indian War." French deported from Nova Scotia (1755); British under **Wolfe capture Quebec** (1759); **New France ceded to England** by Peace of Paris (1763).

ENGLISH PERIOD

1774. Quebec Act passed by British Parliament to organize government for Canada.
1775-83. American Revolution; Loyalists flee to Canada; colonists' attack on Quebec repulsed.
1791. Canada divided into **Upper** and **Lower Provinces** by the **Constitutional Act** passed by British Parliament; popular assemblies established with limited powers.
1793. **Sir Alexander Mackenzie** reaches the Pacific Ocean.

1800

1812-15. War with the United States; American attempts to invade Canada repulsed; surrender of **Detroit** (1812); naval **battle of Lake Erie** (1813).
1812-20. Earl of **Selkirk** founds settlement in Red River Valley.
1837-38. Rebellions against officialdom; French Canadians led by **Papineau** attempt to found a republic in lower Canada; **William L. Mackenzie** heads armed rebellion in Upper Canada.
1838. **Lord Durham** sent out from England to determine conditions in Canada; famous report to colonial office leads to changes in Canadian policy.
1840. Act of Union joins the two provinces under a royal governor.
1842. Webster-Ashburton treaty between Great Britain and United States settles Maine boundary dispute.
1854. Reciprocity treaty with the United States; abrogated by United States (1866).
1858. Capital removed to **Ottawa.**
1864. Quebec Conference held to consider question of confederation.

DOMINION PERIOD

1867. British North America Act establishes the **Dominion of Canada** (Confederation of Ontario, Quebec, New Brunswick, Nova Scotia), with self-government.
1867. Conservative government organized by **Sir John Macdonald** (premier 1867-73, 1878-91).
1869. Hudson's Bay Company's land purchased by Canadian government.
1870. **Rebellion of Red River** half-breeds against extension of Dominion control over Manitoba; led by **Louis Riel.** Province of **Manitoba** formed.
1871. Treaty of Washington between Great Britain and the United States provides for the settlement of the Nova Scotia fisheries dispute and the Oregon boundary question.
1871. British Columbia joins the Union.
1872. Anti-Unionist agitation in Nova Scotia ended by defeat of the party in general elections.
1873. **Prince Edward Island admitted** to the Union.
1873. Conservative government overthrown because of Canadian Pacific Railroad scandal; **Alexander Mackenzie** forms Liberal government.
1878. Conservatives restored on protectionist platform.
1885. **Riel** leads half-breed rebellion in Saskatchewan to obtain squatter rights.
1885. Canadian Pacific Railroad finished.
1893. Bering Sea controversy with the United States settled.
1896. Conservatives defeated on question of reëstablishment of Roman Catholic schools in Manitoba.
1896-1911. **Sir Wilfrid Laurier** premier (Liberal).

1900

1903. Alaskan boundary dispute settled.
1905. **Alberta** and **Saskatchewan** organized as provinces.
1911. Liberals defeated on the question of reciprocity with the United States.
1911-20. **Sir Robert Borden** premier (Conservative).
1914-18. World War (*see* separate outline).
1917. **Unionist government** of Conservatives and Liberals formed to secure support for conscription.
1917. Laurier defeated on anti-conscription platform at general elections.
1919. Labor unrest expressed in severe general strike in Winnipeg.
1920. National Liberal and Conservative government formed; **Arthur Meighen** premier
1921. Liberals win in general elections; W. L. Mackenzie King premier.

OTHER COUNTRIES

1515-47. Francis I king of France.
1539-43. **De Soto's expedition** in southern United States.
1555-64. Coligny attempts to found Huguenot colony in Florida.

1607. Jamestown, Virginia, **settled** by English colonists.

1618-48. Thirty Years' War in Europe.
1620. Plymouth Colony founded by English Puritans.

1643-1715. Louis XIV king of France.

1688. William III of Orange ascends English throne.
1689-97. War of Louis XIV over succession in the Rhenish Palatinate.
1699. French settle in Louisiana.

1701-13. War of the Spanish Succession in Europe.
1702-14. Anne queen of England.
1727-1760. George II king of England.

1741-48. **War of the Austrian Succession.**

1756-63. **Seven Years' War** in Europe.

1789-95. **French Revolution.**
1792-1815. Wars of the French Revolution and Napoleon.

1803. United States buys Louisiana territory from France.
1832. Parliamentary **Reform Act** passed by the British Parliament.
1837. Victoria ascends the British throne.

1846. Boundary between the United States and Canada settled at 49th parallel.

1861-65. Civil War in the United States.

1866. Atlantic cable laid.

1870-71. **Franco-Prussian War.**

1887. First British Colonial Conference.

1899-1902. **Boer War** in South Africa.

1901. Commonwealth of Australia formed

1914. Panama Canal opened.

1918. Suffrage extended to women in Great Britain.

PERIOD OF DISCOVERY—1000-1600

1000. Leif the Lucky (**Northman**) discovers America.
1492. **Columbus discovers America.**
1497. **John Cabot discovers Newfoundland**, etc.
1519. **Ponce de Leon discovers Florida.**
1513. **Pacific Ocean discovered** by **Balboa.**
1519–21. **Conquest of Mexico** by **Cortez.**
1528–36. **Narvaez** and **De Vaca explore** the **Gulf Region.**
1534–43. **Cartier discovers** and explores the **St. Lawrence.**

FOUNDING OF THE THIRTEEN COLO

VIRGINIA

1607. **Jamestown founded** (first permanent English settlement). Captain **John Smith.**
1611–16. "Dale's Rule."
1619. House of Burgesses meets (**first representative assembly in America**).
1619. First **negro slaves introduced.**
1624. **Virginia** becomes a royal colony.
1642. **Berkeley** becomes governor.
1652–58. **Self-government** under the Protectorate.
1676. **Bacon's rebellion.**
1693. William and Mary College founded.
1710–22. Spotswood governor.

MARYLAND

1632. **Maryland granted to Lord Baltimore.**
1634. **St. Mary's** settled by English Catholics.
1647. **Representative assembly established.**
1649. **Act of toleration** for all Christians passed.
1691. **Maryland** becomes a **crown colony.**
1729. **Baltimore** founded.

NEW YORK

1609. **Hudson discovers the Hudson River.**
1614. **Dutch trading post established** on Manhattan Island.
1626. **New Amsterdam** founded.
1629. Patroon system organized.
1638. **Swedes settle along the Delaware.**
1655. Dutch seize Swedish colony.
1664. **New Amsterdam** captured by English fleet; becomes **New York.**
1683. **First assembly** in New York.
1688. New York united to New England under Andros.

NEW JERSEY

1664. **New Jersey granted to Berkeley and Carteret.**
1674. Colony divided into East and West Jersey.
1682. Penn purchases East Jersey.
1702. **Two Jerseys reunited as a royal province.**

DELAWARE

1623–64. **Dutch and Swedes** settle west side of Delaware Bay and River.
1682. Delaware included in Penn's grant.
1703. **Delaware** becomes a **separate colony.**

MASSACHUSETTS

1620. **Pilgrims land** at **Plymouth.** ('**Mayflower**' voyage.)
1623. **New Hampshire settled** at Dover.
1630. **Boston** (Massachusetts Bay Colony) **founded.**
1636. **Roger Williams** expelled from Salem.
1638. **Harvard College** founded.
1643. **New England Confederation** formed.
1645. Free school at Roxbury.
1652. Massachusetts extends control over Maine.
1675. **King Philip's War** in New England; Indian uprising against settlers suppressed.
1684. Massachusetts charter annulled.
1686. **Andros** becomes **governor** of New England.
1691. **Plymouth unites with Massachusetts.**
1692. Salem **witchcraft** cases.

NEW HAMPSHIRE

1680. **New Hampshire separates** from Massachusetts.

RHODE ISLAND

1636. **Roger Williams founds Providence.**
1638. **Newport** settled.
1663. **Rhode Island** obtains a **charter.**

CONNECTICUT

1635. **Hartford, Windsor,** etc., settled.
1637. **Pequot War.**
1638. **New Haven** founded.
1662. **Charter** granted to **Connecticut.**

STRUGGLE BETWEEN FRANCE AND GREAT BRITAIN FOR SUPREMACY IN

1689–97. King William's War: New England colonists under Sir William Phips seize **Port Royal, Acadia;** attack on Quebec fails; Peace of Ryswick restores conquests on each side (1797).
1701–13. Queen Anne's War: frontier raids by French and Indians (**Deerfield,** 1704; **Haverhill,** 1708); English capture **Port Royal;** expedition against Quebec unsuccessful. **France cedes Hudson Bay region, Newfoundland,** and **Nova Scotia** (Acadia) to **Great Britain** (Treaty of Utrecht, 1713).
1744–48. King George's War: Colonists capture **Louisburg** (1745); restored to France by Treaty of Aix-la-Chapelle (1748).
1755–63. French and Indian War: expedition against Fort Duquesne fails (**Bur-**

CONFLICT BETWEEN COLONIES AND PARLIAMENT—

1763. British ministry adopts rigid colonial policy; **Navigation Acts** restricting colonial commerce to England strictly enforced; renewal of Sugar Act taxing importations from foreign colonies.
1764. **Stamp Act** resisted in the colonies. **Virginia resolutions** (1765); **Stamp Act Congress** protests against colonial policy (1765); Act repealed.
1767. **"Townshend Acts"** to enforce trade laws and taxing tea, paper, etc. Boston riot (1770); Boston Tea Party (1773).

REVOLUTIONARY WAR—1775-1783

1775. Skirmishes at **Lexington** and **Concord;** Capture of **Ticonderoga** and **Crown Point;** Battle of **Bunker Hill.**
1775. Second Continental Congress meets.
1776. British **evacuate Boston;** naval attack on Charlestown fails.
1776. July 4. Declaration of Independence adopted.
1776–77. **Washington retreats** across New York and New Jersey (Battles of **Long Island, White Plains, Trenton,** and **Princeton**).
1777. British attempt to cut the colonies in two: **Burgoyne's** and **St. Leger's campaign** from Canada **fails** (**Oriskany, Bennington, Saratoga**). **Howe's campaign** against Washington (Battle of **Brandywine,** occupation of **Philadelphia, Germantown**).
1777. Congress adopts **Articles of Confederation** (ratified by states, 1777–81).
1777–78. Washington winters at **Valley Forge.**
1778. **France recognizes independence of the colonies;** arrival of French army under **Rochambeau.**
1778. British **evacuation of Philadelphia** and retreat toward New York (**Monmouth**).
1778–79. **George Rogers Clark** marches through Illinois territory; capture of **Kaskaskia** and **Vincennes.**
1779. British defeat Americans and French near **Savannah; British occupy Georgia.**
1779. Naval battle between the **'Bonhomme Richard'** and the **'Serapis'** (**John Paul Jones**).

CRITICAL PERIOD—1783 TO 1789

1785. Maryland and Virginia delegates meet at Alexandria to consider commercial relations of the two states.
1786. Annapolis Convention to consider commerce of the country calls general convention at Philadelphia.
1786–87. **Shays' rebellion** in Massachusetts, caused by heavy taxes and general poverty, suppressed with difficulty.
1787. Northwest Ordinance organizes government in the Northwest Territory.

1542. **De Soto discovers** the **Mississippi** River.
1540–42. **Coronado explores** the **Southwest.**
1565. Spanish found **St. Augustine.**
1584–90. **Raleigh attempts** to establish a **settlement** on Roanoke Island.

NIES

OTHER EVENTS IN NORTH AMERICA

1604. Port Royal founded (**first** permanent **French settlement**).

1608. Quebec founded by **Champlain.**

1610. Hudson discovers Hudson Bay; **England claims** the **Hudson Bay region.**

1673. **Marquette** and **Joliet explore** the **Mississippi.**

1682. La Salle descends the Mississippi to its mouth.

1701. **Detroit** founded as French fort and trading post.

1718. French settle **New Orleans.**

CAROLINA

1663. **Charter** for Carolina **granted** to **Lord Clarendon** and others.

1669. Fundamental constitution drawn up by John Locke.

1680. **Charleston settled.**

1719–21. Overthrow of proprietary government.
1729–31. Division into North and South Carolina.

SOUTH CAROLINA | **NORTH CAROLINA**

PENNSYLVANIA

1681. **Charter** for **Pennsylvania** granted to **William Penn.**
1682. Philadelphia founded.

GEORGIA

1733. **Georgia settled by Oglethorpe.**
1752. **Georgia a royal colony.**

NORTH AMERICA—1689-1763

goyne's defeat); expedition against French at **Crown Point** (Battle of **Lake George, 1755**); capitulation of French frontier posts (Duquesne, Frontenac, etc.); **capture of Quebec** by **Wolfe (1759). France cedes Cape Breton, Canada,** etc., to **Great Britain** (Treaty of Paris, 1763).

1763-1774

1774. Boston Port Bill closing the port, and other acts to punish Massachusetts.
1774. First Continental Congress draws up **Declaration of Rights.**

1780. British victory at **Camden.**

1780–81. War in the South: **Charleston captured** by the British; battles of **King's Mountain, Cowpens, Guilford, Eutaw;** Cornwallis retreats to the north.

1781. Siege of **Yorktown; surrender of Cornwallis.**

1782. Evacuation of Savannah and Charleston; hostilities cease.
1783. Treaty of Paris: **Great Britain recognizes the independence of the colonies.**

1787. Federal Constitution framed by the **Constitutional Convention;** ratified by 11 states by end of 1788.

		OTHER COUNTRIES
1789	1789–97. **George Washington,** President, **John Adams,** Vice-President. **1789. First Congress** meets at New York; State, Treasury, and War departments organized. 1789. **First 10 Amendments** to the Constitution adopted by Congress and sent to states. 1790. First census: population, 3,929,214. 1790. **National debt funded;** state debts assumed by federal government. 1790–95. Indian war in the Northwest Territory. 1791. **First national bank** chartered by Congress. 1791. **Vermont admitted; Kentucky** (1792); **Tennessee** (1796). 1793. Eli Whitney invents the cotton gin. 1794. **Genet,** minister from France, **recalled** for unneutral acts. 1794. **Whisky rebellion** in western Pennsylvania against internal revenue law. **1794. Jay treaty** of amity and commerce with Great Britain.	**1789. French Revolution** begins. 1793. War between France and England. 1793–94. Reign of Terror in France.
1797	1797–1801. **John Adams,** President (Federalist); **Thomas Jefferson,** Vice-President (Democratic-Republican). 1797. **X Y Z Affair** with France leads to naval war; Alien and Sedition Acts passed against French partisans. **1798. Virginia and Kentucky resolutions** directed against **Alien** and **Sedition Acts** assert right of nullification. 1798. **Eleventh Amendment** adopted. **1800.** Presidential election: Republicans holding democratic ideas of strict construction and "states' rights" defeat aristocratic Federalists advocating strongly centralized government. 1801. **John Marshall** made Chief Justice.	1799. **Napoleon** made First Consul.
1801	1801–09. **Thomas Jefferson,** President (Democratic-Republican); **Aaron Burr** (1801–05), **George Clinton** (1805–09), Vice-Presidents. 1801–05. **War with Tripoli;** end of tribute to Barbary states. 1803. **Ohio admitted.** 1803. **Louisiana Purchase** from France extends U. S. boundary to Rockies. 1804. **Twelfth Amendment** provides separate ballots for president and vice-president. 1807. Fulton's steamboat makes successful trial voyage. 1807. Dispute with Great Britain over neutral commerce and the impressment of seamen (**Chesapeake Affair**). 1807–09. Embargo against Great Britain and France in retaliation for their blockade of European ports. 1808. Importation of slaves prohibited.	1804. **Napoleon** becomes **emperor.** 1806. Napoleon establishes **Continental** ("paper") **Blockade.** 1806. England issues **Orders in Council** blockading French territories.
1809	1809–17. **James Madison,** President (Democratic-Republican); **George Clinton** (1809–13), **Elbridge Gerry** (1813–17), Vice-Presidents. 1811–14. Indian war in the West (**Tippecanoe**). 1812. **Louisiana admitted; Indiana** (1816). **1812–15. War with Great Britain.** Unsuccessful invasions of Canada (1812, 1814); **British take Washington** (1814); Battle of **New Orleans** (1815). Numerous naval duels; Perry's **victory** on **Lake Erie** (1813). **Treaty of Ghent** (1814). 1814. **Hartford Convention** protests against embargo and war. 1816. Second national bank chartered. 1816. Mildly protective tariff passed.	1810–25. **Spanish** and **Portuguese colonies** in Central and South America become **independent.** 1815. Battle of **Waterloo.** 1815. **Treaty** of **Vienna; Holy Alliance** formed.
1817	1817–25. **James Monroe,** President (Democratic-Republican); **D. D. Tompkins,** Vice-President (1817–25). 1817. **Mississippi admitted; Illinois** (1818); **Alabama** (1819); **Maine** (1820); **Missouri** (1821). 1817. **Seminole Indian War** in Florida. 1818. Great Britain and the United States agree upon joint occupation of Oregon territory. **1819. Florida acquired** from Spain. **1820. Missouri Compromise** on question of slavery in territories. **1823. Monroe Doctrine** advanced against the aggression of the Holy Alliance in America. 1824. Protective tariff passed. 1824. Internal Improvements Bill passed.	1821. Russia attempts to restrict trade on North Pacific coast.
1825	1825–29. **John Quincy Adams,** President (Democratic-Republican); **John C. Calhoun,** Vice-President. 1825. **Erie Canal** completed. 1828. "Tariff of Abominations"; **tariff becomes a live issue.**	

		OTHER COUNTRIES
1829	1829–37. **Andrew Jackson,** President (Democrat); **John C. Calhoun** (1829–33), **Martin Van Buren** (1833–37), Vice-Presidents. 1829. **"Spoils system"** appointments to office. 1830. **Webster-Hayne debate** on **"state rights."** **1830. Baltimore and Ohio Railway opened,** first steam locomotive in America. 1831. William Lloyd Garrison establishes **The Liberator,** a journal advocating abolition of negro slavery. 1832. New tariff bill reduces duties but retains principle of protection. **1832.** South Carolina passes **ordinance "nullifying"** the tariff; Jackson's proclamation denounces nullification; **"Force Bill"** passed (1832); **Compromise tariff** (1833); nullification ordinance repealed. 1832. Jackson reëlected; system of **national nominating conventions** begins. 1832–37. Jackson's **war on the National Bank;** act for renewal of charter vetoed; government deposits removed (1833). 1835–42. War against **Seminole Indians** in Florida. 1836. **Arkansas** admitted; **Michigan** (1837). 1836. **"Specie circular"** issued requiring the payments for public lands to be made in specie.	1830. Independent monarchy established in Belgium. 1830. **Louis Philippe** ascends French throne. **1832.** English parliamentary **Reform Bill** passed. 1835. **Texas** secedes from Mexico and **establishes an independent state.**
1837	1837–41. **Martin Van Buren,** President (Democrat); **R. M. Johnson,** Vice-President. **1837. Financial panic,** due to over-speculation and unsound financial policies. 1840. **Independent treasury established.** 1840. **"Hard cider" campaign** results in a Whig victory.	1837. Queen **Victoria** of England begins her long reign.
1841	1841. **William Henry Harrison,** President (Whig); **John Tyler,** Vice-President. 1841. Death of Harrison.	
	1841–45. **John Tyler,** President (Whig). 1841. Tyler vetoes bill to reëstablish the national bank (1841) and bill for a "Fiscal Corporation"; break between Tyler and the Whigs; entire cabinet resigns. **1842. Webster-Ashburton treaty** with Great Britain settles the Northeast boundary dispute. 1842. **Dorr Rebellion** in Rhode Island secures liberal constitution. **1844. First telegraph,** between Washington and Baltimore, completed. 1844. James K. Polk (Democrat) elected President. **1845. Texas annexed** to the United States; **Florida** admitted.	
1845	1845–49. **James K. Polk,** President (Democrat); **George M. Dallas,** Vice-President. 1846. **Iowa** admitted; **Wisconsin** (1848). 1846. **Northwest boundary** line settled at **49th parallel** by treaty with Great Britain. 1846. Low tariff enacted. **1846–48. Mexican War.** American victories at **Buena Vista** (1847); **Cerro Gordo** (1847); capture of **Mexico City** (1847). **Treaty of Guadalupe Hidalgo** (1848), Mexico relinquishes claims to Texas; cedes **New Mexico and Upper California to United States.** 1846. Wilmot Proviso prohibiting slavery in territories acquired from Mexico defeated. 1848. Territory of **Oregon organized** without slavery. 1848. Presidential election results in Whig victory. Formation of the **Free Soil Party.**	1846. Great Britain repeals corn laws, **free trade** established. 1848. **Revolutions** in France and Italy; **second French Republic** founded.
1849	1849–50. **Zachary Taylor,** President (Whig); **Millard Fillmore,** Vice-President. 1849. Rush of gold seekers to California. **1850. Clayton-Bulwer** treaty with Great Britain provides that neither country should have exclusive control over any canal built across Nicaragua or Panama isthmus. 1850. Death of President Taylor.	
	1850–53. **Millard Fillmore,** President (Whig). **1850. "Clay's Compromise":** California admitted as a free state; other territory acquired from Mexico left open to slavery; slave trade abolished in the District of Columbia; new Fugitive Slave Law enacted. 1850. Maine adopts **prohibition.** 1851. Rail connection established between New York City and Lake Erie at Buffalo. 1852. **'Uncle Tom's Cabin'** published; stimulates growth of abolition sentiment in North. 1852. Franklin Pierce (Democrat) elected president.	1852. **Louis Napoleon** proclaimed emperor of France.
1853	1853–57. **Franklin Pierce,** President (Democrat); **William R. King,** Vice-President. 1853. **Gadsden Purchase** settles boundary dispute with Mexico. **1854. Kansas-Nebraska Bill** repeals Missouri Compromise and organizes Kansas and Nebraska on the principle of **"squatter sovereignty."** Civil war in Kansas between free state and slave state settlers (1855–57). 1854. Treaty with Great Britain establishes reciprocity with Canada. 1854. Admiral **Perry** secures the **opening of Japanese ports** to foreign trade. 1854–55. **"Know Nothing" Party,** a secret party opposed to foreigners participating in American politics, at the height of its power. 1854–55. Movement to add slave territory to the United States: Ostend manifesto favors annexation of Cuba (1854); filibustering expedition to Nicaragua (1855). **1856. First Republican national convention adopts anti-slavery platform.**	**1854–56. Crimean War**
1857	1857–61. **James Buchanan,** President (Democrat); **J. C. Breckenridge,** Vice-President. **1857. Dred Scott decision** maintains that neither negro slaves nor their descendants can become citizens; that a slave does not become free by being carried to free territories. 1858. **Minnesota** admitted; **Oregon** (1859); **Kansas** (1861). 1859. John Brown's raid on the United States arsenal at Harper's Ferry. **1860. Abraham Lincoln** (Republican) **elected president.** **1861. South Carolina secedes** from the Union; **other Southern states secede to form a confederacy.**	**1861. Italy united** under Victor Emmanuel.

		OTHER COUNTRIES
1861	1861–65. **Abraham Lincoln,** President (Republican); **Hannibal Hamlin** (1861–65), **Andrew Johnson** (1865), Vice-Presidents. **1861–65. Civil War.** **1861. Apr. 12. Fort Sumter fired upon** by the Confederates. 1861. July 21. Union army defeated at **Bull Run.** 1861. Seizure of Confederate commissioners (**Mason** and **Slidell**) from British steamship nearly leads to war. 1862. Apr. 6–7. Grant's victory at **Shiloh;** McClellan's **peninsular campaign** (Mar.-July); naval battle (Mar. 9) between **Monitor** and **Merrimac; New Orleans** captured by **Farragut** (Apr. 23). 1862. **Slavery abolished in the District of Columbia.** 1863. Jan. 1. Lincoln issues the **Emancipation Proclamation.** 1863. July 1–3. Union victory at **Gettysburg; Vicksburg** captured (July 4). 1863. **West Virginia** admitted as a free state. 1864. **Grant** made commander-in-chief of the Union armies. **Sheridan's raid** up the Shenandoah Valley; **Sherman's march** to the sea; capture of **Mobile.** 1864. **Nevada** admitted. 1864. Lincoln reëlected. **1865. Apr. 9. Lee surrenders** at **Appomattox Court House.** 1865. Apr. 14. **Lincoln assassinated.**	1861–88. **William I** king of Prussia. 1861–67. **Maximilian** attempts to found **monarchy in Mexico.**
1865	1865–69. **Andrew Johnson,** President (Republican). 1865. Proclamation extending **amnesty** to the South (14 classes excepted). 1865. **Thirteenth Amendment prohibits slavery** in the United States. 1865–67. President quarrels with Congress over the reconstruction policy; Congress passes over his veto **Civil Rights Bill** to extend citizenship to freedmen (1866), act continuing **Freedmen's Bureau, Reconstruction Act** (1867), and **Tenure of Office Bill** (1867). 1867. **Alaska** purchased from Russia; **Nebraska** admitted to the Union. 1867. Johnson forces French to withdraw army from Mexico. 1868. President impeached; conviction fails by one vote (two-thirds of Senate required). 1868. **Fourteenth Amendment extends citizenship to freedmen.**	**1866. Austro-Prussian War.** **1866.** Permanent **Atlantic cable laid.** 1867. **Dual monarchy** of Austria-Hungary established.
1869	1869–77. **Ulysses S. Grant,** President (Republican); **Schuyler Colfax** (1869–73), **Henry Wilson** (1873–77), Vice-Presidents. 1870. **Fifteenth Amendment extends franchise to the negroes.** 1871. **Treaty of Washington** with Great Britain provides for a clearer definition of the Oregon boundary, settlement of disputes over the Canadian fisheries, and arbitration of the "Alabama claims." **1872. General Amnesty Act** restores most of the ex-Confederates to their civil and political rights. 1872. Grant reëlected; **National Reform-Labor Party** adopts platform of labor and economic reform; **Prohibition Party** names presidential candidates. 1873. Financial panic. 1873. Grant vetoes bill to increase paper money; Congress decides to **resume specie payments** (1875). 1872–74. Political scandals: **"Credit Mobilier"** implicates public men in Union Pacific scandal; **"Salary Grab" Act** greatly increasing congressmen's salaries (1873); **Whiskey Ring conspiracy** to defraud government of internal revenue on distilled liquors (1874). 1876. **Colorado** admitted. 1876. Election returns disputed; commission declares Republican candidate elected (Rutherford B. Hayes). 1876. Custer Indian massacre in Montana.	1869. **Suez Canal opened.** 1870–71. **Franco-Prussian War.** **1870. Third French Republic** proclaimed. **1870. Union of Italy completed.** 1871. **German Empire** established.
1877	1877–81. **Rutherford B. Hayes,** President (Republican); **William A. Wheeler,** Vice-President. 1877. **Federal troops withdrawn from the South.** 1877. Railroad and miners' strikes contribute to widespread **industrial depression.** 1878. **Greenback Party** favoring "cheap money" at height of power. 1878. **Bland-Allison Act** for purchase and coinage of silver passed over Hayes' veto. **1879. Specie payments resumed.** 1880. Hayes fails of renomination because of his differences with party politicians.	1877–78. **Russo-Turkish War.**
1881	1881. **James A. Garfield,** President (Republican); **Chester A. Arthur,** Vice-President. 1881. Garfield assassinated (July 2).	
	1881–85. **Chester A. Arthur,** President (Republican). 1883. Pendleton **Civil Service Reform Bill** passed. 1884. Civil government established in Alaska. 1884. Bitter presidential election campaign; independent Republicans ("Mugwumps") swing to Democratic support.	1882. **Triple Alliance** formed between Germany, Austria, and Italy. 1884. **Partition of Africa.**
1885	1885–89. **Grover Cleveland,** President (Democrat); **T. A. Hendricks,** Vice-President. 1885. Immigration of contract laborers forbidden. 1887. **Interstate Commerce Act** passed; beginning of national regulation of railroads. 1888. Bill for tariff for revenue only fails to pass Congress. 1889. **Department of Agriculture** established.	1888–1918. **William II** emperor of Germany.
1889	1889–93. **Benjamin Harrison,** President (Republican); **Levi P. Morton,** Vice-President. 1889–90. Admission of **North and South Dakota, Idaho, Montana, Washington,** and **Wyoming.** 1889. **Oklahoma** thrown open to settlement. 1890. **McKinley tariff** establishes protectionist principle. 1890. **Sherman Anti-Trust Act** passed to prevent monopolies by corporations. 1890 **Silver Purchase Act** provides for monthly purchases of silver to be paid for in treasury notes. 1890. Controversy with Germany over the **Samoan Islands** settled by the Treaty of Berlin. 1891. **People's Party** (Populists) formed. 1892. Cleveland (Democrat) elected again on tariff issue. 1893. **Bering Sea controversy** with Great Britain referred to arbitration.	1891. **Dual Alliance** of France and Russia announced.

		OTHER COUNTRIES
1893		
	1893–97. **Grover Cleveland,** President (Democrat); **Adlai E. Stevenson,** Vice-President.	
	1893. Treaty for the annexation of Hawaii withdrawn from Senate.	
	1893. Financial panic.	
	1893. Silver Purchase Act repealed and **gold standard supported.**	
	1894. Tariff duties reduced.	
	1894. **Pullman railroad strikes** suppressed by Federal troops.	
	1895. United States demand for arbitration of **British-Venezuelan controversy** acceded to by Great Britain.	
	1896. **Utah** admitted to the union.	
1897		
	1897–1901. **William McKinley,** President (Republican); **Garret Hobart** (1897–1901), **Theodore Roosevelt** (1901), Vice-Presidents.	1897. **Marconi** perfects the **wireless telegraph.**
	1897. **Dingley tariff** reëstablishes high protection.	
	1898. United States battleship **Maine** blown up in Havana harbor.	
	1898. Spanish-American War: Spanish fleets destroyed at **Manila Bay** and **Santiago;** invasion of Cuba. Spain recognizes **Cuban independence; Porto Rico, Guam,** and the **Philippines** ceded to United States; **Cuba occupied** by United States until 1902.	
	1898. **Hawaii annexed** to the United States; **Samoan Islands divided** with Germany.	
	1899. Insurrection in the Philippines suppressed; civil government established.	
	1899. Secretary **Hay** obtains recognition of the **"Open Door" policy** toward China.	1899–1902. **Boer War** in South Africa.
	1900. Currency law adopts **gold standard.**	**1899. First Hague Peace Conference.**
	1900. Reëlection of McKinley on the "full dinner-pail" platform.	1900. **Boxer uprising** in China.
	1901. McKinley assassinated (Sept. 6).	
1901		
	1901–09. **Theodore Roosevelt,** President (Republican); **Charles W. Fairbanks,** Vice-President (1905–09).	1901–10. **Edward VII** king of England.
	1901. **Hay-Pauncefote** treaty with Great Britain allows United States to build Panama Canal on condition that it be open to all nations on equal terms.	1902. **Trans-Siberian railway** opened.
	1902. French interests in **Panama Canal purchased; canal zone obtained** from Panama by treaty (1904).	1903. **Panama** declares itself an **independent republic; immediate recognition** by President Roosevelt.
	1902. **Anthracite coal strike** settled by commission appointed by the President.	
	1903. **Alaskan boundary dispute** with Great Britain settled.	1904–1905. **Russo-Japanese War;** mediation of Roosevelt results in the **Peace of Portsmouth.**
	1903. Beginning of **stricter government regulation of transportation and trade; Department** of **Commerce** and **Labor** created, railroad rebates abolished (1903); jurisdiction of Interstate Commerce Commission extended (1905); suits brought against trusts under Sherman Anti-Trust Law; **Hepburn Act** regulating railroad rates passed (1906); Meat Inspection and Pure Food Acts passed (1906).	
	1903. **Development of democratic government;** state-wide **primary election law** in Wisconsin followed by widespread adoption in other states; **initiative and referendum** adopted by Oregon (1902).	
	1905. **Intervention in Santo Domingo** to establish financial responsibility.	**1907. Second Hague Peace Conference.**
	1906–09. **Intervention in Cuba** to restore order following armed revolt.	1907. **Triple Entente** formed between Great Britain, France, and Russia.
	1907. **Oklahoma** admitted as a state.	**1908–1909. Naval Conference at London** adopts rules for naval warfare.
	1908. Movement for the **conservation of natural resources** begun.	
1909		
	1909–13. **William Howard Taft,** President (Republican); **James S. Sherman,** Vice-President.	1909. Commander **Peary** reaches **North Pole.**
	1909. **Dispute with Venezuela** arbitrated.	
	1909. **Payne-Aldrich tariff** passes (opposed by Progressive Republicans).	
	1910–13. Administration pursues **policy of non-intervention in Mexican revolutions.**	1910. **George V** becomes king of England.
	1910. Rules of the House of Representatives reformed.	
	1910. Coalition of insurgents with Democrats in congressional elections results in Democratic majority in the House.	
	1910. Postal savings bank created; parcel post, 1912.	
	1911. Canada refuses to ratify reciprocity treaty.	**1911. Revolution in Mexico;** Diaz resigns.
	1911. Bills for tariff reductions vetoed by President.	1911–12. **War between Italy and Turkey** in Tripoli.
	1912. **Panama Canal Tolls Act** exempts American coastwise shipping from tolls.	1911. **Amundsen** reaches **South Pole.**
	1912. Territorial government established in Alaska.	1912–13. **Wars** between **Balkan allies and Turkey.**
	1912. **Arizona** and **New Mexico** admitted as states.	**1912. Chinese Republic** proclaimed.
	1912. **Arbitration treaties** with Great Britain and France ratified.	
	1913. **Sixteenth Amendment** gives Congress power to levy **income tax.**	
	1912. Taft renominated; **Progressive Party** nominates Roosevelt; Woodrow Wilson, Democrat, elected.	
1913		
	1913–21. **Woodrow Wilson,** President (Democrat); **Thomas R. Marshall,** Vice-President.	
	1913. Seventeenth Amendment provides for election of senators by the people.	
	1913. **Underwood-Simmons tariff** lowers duties.	
	1913. **Federal reserve system** of banks created.	
	1913–14. Many **peace and arbitration treaties** negotiated by **Bryan** as Secretary of State.	1914. Direct wireless communication established between Germany and United States.
	1914. Federal Trade Commission created; Clayton Anti-Trust Act passed; graduated **income tax law** passed.	
	1914. Panama Canal Tolls Act repealed; **canal opened.**	
	1914. Dispute with Mexico over "Tampico incident"; **American troops occupy Vera Cruz.**	**1914–18. World War.**
	1914. Neutrality in European war proclaimed.	
	1916. Tariff Commission created.	
	1916. **Adamson Law** establishes eight-hour day for railway employees.	
	1916. Punitive **expedition** sent **into Mexico.**	
	1916. Wilson reëlected on a peace platform.	
	1917. War declared against Germany (*see* Outline III for World War).	
	1918. Republican Congress elected.	1919. **Treaty of Versailles** signed.
	1919. **Eighteenth Amendment establishes nation-wide prohibition.**	1919. First transatlantic flights, both airplane and dirigible.
	1919. Treaty of Versailles fails to receive two-thirds majority **in the Senate.**	**1920. League of Nations established.**
	1920. **Nineteenth Amendment establishes nation-wide woman suffrage.**	
1921		
	1921. **Warren G. Harding,** President (Republican); **Calvin C. Coolidge,** Vice-President.	
	1921. Emergency Tariff Bill passed.	
	1921. **Budget Bill** passed establishing **budget system** in national finance.	1921. Famines in Russia and China.
	1921. **Treaty with Colombia** ratified paying her $25,000,000 compensation for seizure of Panama in 1904.	1921. Ex-Emperor Charles unsuccessfully attempts to regain throne of Hungary; exiled to Madeira.
	1921. Bill passed greatly **restricting immigration.**	
	1921. President signs joint Congressional resolution declaring **peace with Germany and Austria** (July 2).	
	1921. **Limitation of Armament Conference** meets at Washington in November.	

HITTITES (*hĭt'ītz*). In Asia Minor, that ancient battleground between the East and the West, it was the fate of many a nation to rise to power and glory, and then fall into obscurity. But probably no other people of that region were for many centuries so utterly forgotten as the Hittites, who more than 3,000 years ago had not only made their power felt in all parts of Asia Minor but had spread over part of Syria and Mesopotamia. Except for some references in the Bible, this interesting people was entirely unknown to the modern world until recent years. Then scholars found their story in buried monuments and inscriptions, and traced their influence on their Asiatic neighbors and even on the Greeks across the Aegean Sea. It is now thought that we can trace some of their features in the Hebrews of today, while the Armenians at present living in the Hittite country have the same general profile. Only a beginning has been made in deciphering Hittite inscriptions, and much of their story remains untold.

Among the most interesting remains of Hittite civilization are the sculptures carved in the living rock. Some of these depict vivid scenes of stag and lion hunts, and show that the Hittites were among the earliest peoples to make use of the horse; others represent processions of men paying homage to the gods. The architecture of the Hittites resembles that of the Assyrians in many respects. As between the Hittites and their neighbors, such as the Assyrians, it is hard to tell who were the originators and who were the imitators, but certain it is that many civilizations mingled in this ancient land. Among the carved figures in Hittite ruins is the double eagle, found also in the Babylonian coat of arms.

The Hittite religion was a sort of Nature worship. They worshiped many gods, but their chief deity was the Great Mother, the goddess who caused the earth to bring forth its fruit for man.

The Hittites first appear in history about 2000 B.C., when there were a number of tribes among them, each with its own king. About 1500 B.C. one of these tribes gained the leadership and controlled a great empire. For about two centuries and a half this empire maintained its power, and then invasion by new peoples and wars with Assyria and Egypt weakened it. Finally Sargon II of Assyria, in 717 B.C., put an end to the Hittite empire. After that the Hittites were absorbed by other peoples, and their civilization became a fading memory.

HOCKEY. Field hockey, as played today, is the development of a game known in the British Isles for centuries under the names "hurley," "shinty," and "bandy." A crude form of the game was also played very early on the European continent; and in the Copenhagen National Museum there is an altar pot, made about the year 1330, on which are shown two hockey players with sticks and a ball.

Modern hockey is very much like association football. The main difference is that in hockey the players hit a small solid ball with a stick, whereas in association football they kick a large inflated ball. Hockey is one of the best of games, and in America it is even more enthusiastically played by girls than it is by boys. Many girls' schools have hockey teams and there is great enthusiasm for inter-class and inter-school matches.

The regulation field is 100 yards long and 60 yards wide, but the game is often played on smaller fields. The goals at either end are 12 feet wide and 7 feet high. In front of each goal is drawn a flattened semi-circle with radii of 75 yards from the goal posts. The attacking side cannot score a goal unless the ball was last hit by one of their team inside this roughly semi-circular area.

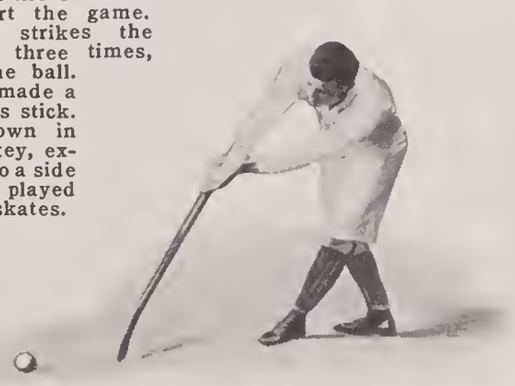
A cricket ball, painted white, is used. The sticks are hooked clubs not more than two inches wide in any part and with a flat face along the crook. A team usually consists of 11 players—5 forwards, 3 halfbacks, 2 backs, and a goal-keeper. The game is

TESTS OF SKILL IN FIELD HOCKEY



The picture above was taken just at the moment when a "White" player has scored a goal for his side by driving the ball between the goal posts. At the left two players are "bullying" the ball to start the game. A player from each side alternately strikes the ground and then his opponent's stick three times, after which either may strike the ball. The man at the right has just made a stroke with the reverse side of his stick. Ice hockey, which is better known in America, is similar to field hockey, except that there are seven players to a side instead of eleven, and the game is played on the ice, with the players on skates.





divided into two halves not longer than 35 minutes each, and the teams change sides at the end of each half.

A recent development of field hockey is ice hockey, the national winter sport of Canada, also a popular game in the northern part of the United States. The American Amateur Hockey League was formed in 1896. There are 7 men on a team—4 forwards (the right and left centers and the right and left wings) and 3 defense men (the cover-point, the point, and the goal-tender). In place of a ball is substituted a "puck" or disk made of hard rubber, 1 inch thick and 3 inches in diameter. The stick is not more than 3 inches wide at any point and has a blade not more than 13 inches long. The well-equipped hockey player wears strips of felt about an inch thick to protect his shins and knees. His skates preferably are permanently attached to the skating shoes by rivets.

There are no standard dimensions for the rink, but usually the game is played on a space inclosed by side boards 200 feet long by 90 feet wide. The goals are 6 feet wide, 4 feet high, and are placed at least 10 feet from the ends of the rink. A goal is scored when the puck passes between the goal posts.

Ice hockey calls not only for great skill in the art of skating, but for close team-work, the team-mates passing the puck back and forth to each other or "caroming" it off the side boards, as they dodge down the ice and penetrate their opponents' defense.

Hog. To be likened to a hog or pig is looked upon as an unpardonable insult, because it is understood to imply either greediness or filthiness, and all Jews and Mohammedans regard the hog as "unclean" and unfit for human food. But really the hog is no more greedy than any other animal, and in its natural state, instead of being dirty or filthy, it is exceptionally cleanly and will not live in filth if this can be avoided. It is remarkable that despite the religious prohibition against the use of "pork," as swine flesh is called, the hog furnishes a very great part of the meat diet of mankind.



It must be lots of fun to be a member of a Pig Club, as are the cute little fellows we see here, and it is just as much fun to be a farmer boy and belong to a boys' and girls' "Pig Club."

Varieties of wild hogs are found on every continent except Australia. Domestication began in China 7,000 years ago. The domestic hog of Europe and America is descended from the wild boar of Europe, which was in all probability crossed with the Neapolitan and Chinese varieties. (*See* Boar.)

In China the hog is sometimes used as a draft animal, and it is not rare to see a woman, a hog, a horse, and an ass all harnessed together to drag a cart. A hog and a cow are frequently hitched up together. In England a hog-breeder once drove to a fair with four hogs drawing his carriage. Hogs are easily trained to perform various tricks, for they are intelligent and quick to learn some things. On the

THREE MEMBERS OF THE HOG ARISTOCRACY



These represent some of the most famous breeds of Swine. From left to right, they are Duroc, Chester White, and Berkshire. All are fine lard hogs, but the Berkshire is particularly noted for the excellent quality of bacon it provides.

other hand, they are so stubborn that it is said the best way to drive a hog in one direction is to pretend to drive it in the opposite one. In parts of Europe pigs are trained to find truffles, which are a sort of underground fungus highly esteemed for food.

Hogs are very prolific and under favorable conditions produce two litters a year. There are from 6 to 15 or more young pigs in a litter. There is a record of one sow (the female hog) that bore 355 pigs in 20 litters. The mother hog does not take good care of her young, however, and frequently kills some, or an entire litter, by lying on them.

Young pigs born in the spring are marketed in the fall, attaining the normal weight by that time, if properly fed and cared for. An average hog is 80 inches long from nose to tail, and 38 inches high. It weighs from 300 to 400 pounds, depending on its condition; and unusually large ones weigh from 600 to 800 pounds, or even more. Every part of the hog is utilized—the meat for food; the fat (called lard) in cooking; the bristles in making brushes; and the skin, though usually not removed, makes good leather for saddles, purses and other purposes.

Of all animals the hog is the most economical producer of meat, and for that reason it is raised by nearly every farmer in the United States. Four or five pounds of dry feed given to a hog produce a pound of meat, while beef requires from 10 to 12 pounds of the same feed. A fat hog yields almost 80 per cent of its live weight as dressed meat, and a steer only 60 per cent. A hog eats garbage and other waste that no other animal will eat. A cow nine months after breeding produces one calf which weighs when marketed 300 pounds. A sow in the same period produces enough pigs to make 1,500 pounds of finished pork, and if bred a second time will produce a half dozen excellent pigs for a Thanksgiving roast besides.

Hogs are subject to several diseases which sometimes cause great loss. Hog cholera is dreaded by every hog-raiser in America; in 1910 this scourge carried off 10 per cent of the hogs in the United States, causing a loss of $75,000,000. In recent years much relief has been secured by immunizing hogs with serum. Also a parasitic worm called "trichina" finds lodgment in the muscles of the hogs, and causes a serious disease which may be communicated to man.

Like human beings, hogs thrive in clean healthful surroundings, with a good supply of pure fresh water and a variety of wholesome food. While fattening they must be confined to narrow quarters or they will keep thin and wiry by too much exercise. The pen should be kept clean and dry.

The most popular varieties in America are the Poland China, which originated in Ohio, and the Chester Whites, an American strain of the English Yorkshire. The Duroc-Jersey is another popular breed. Several excellent varieties of hogs originated in Great Britain, among them the Berkshire, the Hampshire, the Tamworth, and the Ulster. Hog-breeders seek to develop a hog that is prolific, grows fast, fattens quickly and makes wholesome pork.

Hog-raising and pork-packing have become two of the great industries of the United States, which produces over 40 per cent of the world's supply of pork. "Pig clubs" of farmers' boys and girls to encourage better selection and rearing of hogs have been a brilliant success. The World War and the resulting shortage of fats added greatly to the profits of these industries, and under this stimulus the number of hogs in the United States increased in four years from about 59 million to over 71 million. Bacon was in special demand for export because of the high proportion of fat it contains, because it is easily cooked, and because it keeps well in any climate. The principal pork-packing establishments are located at Chicago, Kansas City, and Omaha. From these pork is shipped to all parts of the world. (*See also* Meat Packing.)

GOODNESS, WHAT A FACE!



The Wart Hog is perhaps the most ridiculous-looking animal in the world. That long face with those strange tusks is bad enough, but when you think that his features are further distorted by those curious wartlike bumps near his eyes and along his nose, it seems as though Nature had indeed played a joke upon this African member of the pig family.

DOUGHTY LITTLE WARRIORS



Although the Peccaries are so small—only about three feet long—even jaguars learn to think twice before attacking them, for they go in herds and the team work with their sharp tusks is very effective.

All hogs belong to the family *Suidae*, which also includes the American peccaries. The domesticated hog is known by the same name as his wild ancestor, the wild boar of Europe, *Sus scrofa*. Among other interesting varieties of wild swine are the long-tusked *Babirussa* of the island of Celebes, *Babirussa alfurus;* the African wart-hog, *Phacochoerus africanus;* and the river-hogs, of the genus *Potamochoerus*, several species of which are found in Africa and the adjacent islands. The hippopotamus is a near relative. The so-called Guinea pig is not a pig at all, but is a cavy, related to the hares and rabbits.

Hoh'enstaufen. A German noble family of the Middle Ages to which belonged the Emperors from Conrad III (1138–1152) to Conrad IV (1250–1254) inclusive—with the exception of Otto IV (1198–1214), who was a member of the rival house of Welf (*see* Guelfs and Ghibellines). Castle Hohenstaufen, from which the family took its name, was in Swabia. The Hohenstaufen epoch was the most glorious period of medieval Germany, especially the reign of Frederick Barbarossa (1152–1190).

Hoh'enzollern. The castle Zollern (or Hohenzollern), near the Danube River in Swabia (southwestern Germany), was first built by one Count Frederick in the year 980 (rebuilt 1850–67). From him is descended the family which, after 1415, gradually raised Brandenburg-Prussia to the rank of a first-rate power in Europe, and in 1871 founded the German Empire. Frederick II and William II are the most notable members of the family. The castle also gives its name to the tiny province of Hohenzollern (441 square miles; an outlying part of Prussia) which surrounds it. (*See* Prussia.)

Holbein (*hōl'bīn*), Hans (1497–1543). In the long ago days when Luther was drifting into his revolt against the Roman Catholic Church, Hans Holbein, a young German artist, left his father's studio in the wealthy old cultured city of Augsburg, to seek his fortune in Basel, Switzerland. His purpose was to furnish illustrations for the wonderful new printed books that were there being published.

The busy Rhine city of Basel boasted in those days "at least one learned man in every house." Among these scholars was the famous Erasmus, who had come to Basel to oversee the publication of the first printed edition of the New Testament in the original Greek, and other works which he had edited. This wise man and the young artist at once struck up a friendship and Holbein drew pictures for a very clever satire, called 'The Praise of Folly' (*Encomium Moriae*), which Erasmus had written for relaxation and which his friends persuaded him to publish. The pictures were quite as clever as the text, and through all the 400 years since that time, whenever 'The Praise of Folly' has been reprinted, Hans Holbein's illustrations have been reprinted with it.

Holbein drew illustrations for many other books also, among them Martin Luther's translation of the Bible into German. He displayed great skill also in other lines. He painted pictures and portraits; he designed stained glass windows; he even drew designs for female costumes! The old saying that artists are born and not made must have been true in the case of Holbein, for without a magic gift from some good fairy, he could hardly, at the early age of 20 years, have excelled in so many lines.

SIR THOMAS MORE INTRODUCING HOLBEIN TO HIS FAMILY



Once, when they had hard times in Europe and people weren't buying many pictures, Holbein resolved to try his fortune in England. So he took letters of introduction from his friend Erasmus to Sir Thomas More, one of the important men at the English Court, and through him secured endless commissions to paint the portraits of the notables of England. The artist and the statesman became very intimate friends. More is here presenting Holbein to his family.

After a time religious strife between Catholics and Protestants became so bitter that life in Basel was most unsettled. Then Holbein, with a letter from his friend Erasmus to an Englishman of influenee, again set out to try his fortune in a strange land. This time he went to London and there, thanks to Erasmus' letter, met with a favorable reception and later became court painter to Henry VIII. The king's fondness for Holbein has passed into a legend. When a nobleman eomplained of the favor shown the base-born artist, the king said: "My lord, know that of seven peasants I ean easily make seven earls, but of the seven earls I cannot make one Holbein!"

In England Holbein was known chiefly as a painter of portraits. An old account of his services at the court of Henry VIII relates that he painted the portrait of the king, "life size, so well that everyone who looks is astonished, since it seems to live as if it moved its head and limbs." The account continues: "He made portraits of the principal folk of the realm in such numbers that it is a matter for wonder how he eould ever have finished so many!"

Although his life was spent in Switzerland and England, Holbein is regarded as a German artist. Comparing him with the other master artists of that nation, it is said: "Dürer was the greater genius, a greater thinker, a greater engraver, but Holbein was the greatest painter Germany has ever produced."

His paintings and drawings are found in most of the larger galleries of Europe. His Madonna, in the grand Ducal Palace of Darmstadt, is one of Germany's masterpieces. His most eelebrated picture is the portrait of his friend Erasmus, in the Louvre, Paris. The finest collection of the Holbein miniatures is that in the Metropolitan Museum of New York City.

HOLIDAYS AND FESTIVALS. Holidays have been observed in all ages and among practically all people. The Greeks had their Olympic games and many other festivals. The Romans eelebrated Lupercalia in the spring and Saturnalia in mid-winter, marked by games, fantastic amusements, and the giving of presents. The earliest of all festivals seem to be connected with the dead, to whom offerings were made. Later they became attached to the sun and moon or to the seasons, seed-time and harvest being occasions for special festivity. All early festivals were in some measure religious, since feasting had always to be shared with the gods. Thus the word holiday meant originally "holy day." Political holidays, celebrating an important victory or the birth of some great leader, were of later growth. In some foreign countries the gradual increase of holidays, religious, national, and local, has led to official regulation.

In the United States there are no legal *national* holidays. Congress does, however, name special holidays and the various states ean make them legal. In nearly all states New Year's Day (January 1), Washington's Birthday (February 22), Independence Day (July 4), Memorial Day (May 30 in the North and April 26 and June 10 in the Southern states), Labor Day (first Monday in September), Thanksgiving Day (last Thursday in November), and Christmas (December 25) are legal holidays by state aetion. Others generally eelebrated are: Lincoln's Birthday (February 12), Arbor Day (fixed by governor), Flag Day (June 14), and Columbus Day (October 12). Another elass of holidays which have no legal recognition but are firmly rooted in customs eenturies old eonsist of Valentine's Day (February 14), April Fools' Day (April 1), May Day (May 1), Hallowe'en (October 31), and Mothers' Day (second Sunday in May). Mothers' Day is an old eustom which has recently been revived by the suggestion of Congress.

In Canada these legal holidays are observed: Dominion Day (July 1), New Year's Day, Good Friday, Easter Monday, Christmas Day, Victoria Day (May 24), Labor Day, and the birthday of the reigning British sovereign.

HOLLAND. That part of the modern Kingdom of the Netherlands which stretches east of the Zuider Zee and north of the River Rhine, and includes the richest and largest cities of the kingdom, such as The Hague (the capital), Amsterdam, Rotterdam, Haarlem, etc. The land is below sea level, and is protected by dikes. Because of the historical, economic, and political importance of the two provinces, North Holland and South Holland, the name "Holland" is frequently applied to the whole kingdom of the Netherlands. (*See* Netherlands, Kingdom of.)

HOLLY. When the Christmas season approaches, each home puts on its gala attire, and sprigs of holly adorn the chandelier and hang in wreaths in the windows. The bright red berries, conspicuous among the dark green prickly leaves, add a cheery note to the occasion. There are about 175 species of holly shrubs and trees, distributed throughout the world, all evergreens. In some of the species the leaves are blackish and they bear yellow or black berries.

In North America the holly is abundant on the bottom lands of eastern Texas and Arkansas, but it also occurs on the Atlantic coast from Massachusetts to Florida and in the Mississippi valley. The American holly sometimes forms a tree 50 feet in height. It is from this species that much of the commercial holly is taken. The European holly, which is even more beautiful than the American, is cultivated as a garden shrub, in America as well as in England. The close-grained white wood is admirably adapted to cabinet work.

Scientific name of American holly, *Ilex opaca.* Bark, light gray and smooth. Leaves simple, alternate, elliptical or oval, with pointed apex and base, having sharp, spinelike teeth. Fruit a small bright red berry which remains on the tree far into the winter.

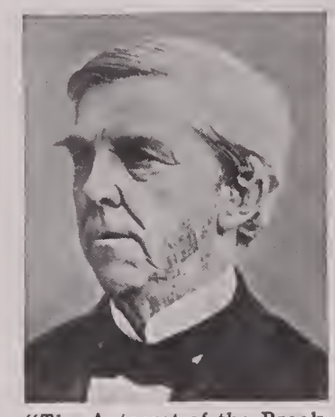
HOLLYHOCK. Clothed with dark green leaves and thickly studded with large bright-hued blossoms, the tall stalks of this treasured old-fashioned plant make a beautiful and stately border for our gardens. Reaching a height of six or eight feet, its spikes stand

in soldierly array, seeming to guard the more modest blossoms that cling closely to Mother Earth.

The hollyhock has been developed from the wild mallow, a native of Syria. It is believed to be the "holy mallow" discovered by the Crusaders and brought to Europe by way of Palestine. Originally it had single rose colored blossoms, but through centuries of cultivation numerous varieties of both double and single flowers have been produced, in many shades of pink and purple, as well as in yellow and white. The glory of the hollyhock has declined of late years because of a very destructive fungus which attacks the plant, making difficult of production the blossoms that once adorned the stalks to within two feet of the ground. The presence of this fungus is first indicated by small spots appearing on the stems and leaves of the plant. Soon afterward the leaves begin to look dry and scorched.

Scientific name, *Althaea rosea.* Flowers about 3 inches across, growing on short peduncles from the stalk; calyx 5-pointed, reinforced by a circle of 6 to 9 bracts; petals 5 in number, large, wedge-shaped, convolute in bud; stamens numerous, united in a tube; styles numerous. Stem tall, thick, hairy. Leaves 5 to 7-lobed, rough, rounded, heart-shaped.

OLIVER WENDELL HOLMES



"The Autocrat of the Breakfast Table"

Holmes, Oliver Wendell (1809–1894). When James Russell Lowell chose Holmes to be the first prose writer for the new *Atlantic Monthly* (1857) he declared confidently: "The success of this magazine rests with Dr. Holmes. He has written little, but you'll see. His mind is like a bright mountain stream that has been dammed up in the hills, waiting only an outlet to the ocean. He has a wonderful store of thought—serious, comic, pathetic, and poetic." The delightful essays entitled 'The Autocrat of the Breakfast Table' proved Lowell a true prophet, for nothing so witty and wise, so humorous and kindly, had been produced in America. In whatever he wrote, Holmes showed a boy's freshness, a man's energy and purpose, a poet's gift, and the high moral tone that marked the work of the great New England writers of his day. And in putting his thoughts on paper he lost none of the sparkle and personal charm that made him a celebrity as conversationalist and lecturer.

Dr. Holmes' success as a writer was the more remarkable because writing was not his chief business. He was a busy physician and Harvard professor, who, besides caring for his big practice, made original scientific investigations and wrote medical works. He was born in Cambridge, Mass. His father was a Congregational minister, professor at Harvard, and historian. Holmes himself had the advantages which he said belonged to a man of family—namely, "four or five generations of gentlemen and gentlewomen" back of him, and "the tumbling about in a library as a child." His life was a busy and uniformly successful one, free from startling events or great misfortunes. After his college days at Harvard he had studied law; then he had taken up medicine, studying in Boston and in Europe.

His fame as a writer began while he was still in college, with his poem 'Old Ironsides', that saved the old frigate *Constitution* from destruction. The volume that contained the funny 'My Aunt' and the inimitable humorous-pathetic 'Last Leaf' appeared the year that he took his M.D. degree at Harvard. So often was Holmes called upon for verses for special occasions that he has been called the poet laureate of Boston. The reputation that his 'Autocrat of the Breakfast Table' brought him never dimmed. He followed those essays with 'The Professor at the Breakfast Table' and 'The Poet at the Breakfast Table', and found time also to write two novels. Not all Holmes' poetry was humorous, as was 'The Wonderful One-Hoss Shay'. Some of it was beautiful and inspiring, like 'The Chambered Nautilus', whose last stanza reads:

> Build thee more stately mansions, O my soul,
> As the swift seasons roll!
> Leave thy low-vaulted past!
> Let each new temple, nobler than the last,
> Shut thee from heaven with a dome more vast,
> Till thou at length art free,
> Leaving thine outgrown shell by life's unresting sea!

Holmes was one of those who can be wise and witty and at the same time cheerful and kind. He could share his knowledge and his culture with people without the slightest hint of chilling superiority. He was well loved all his life long, and received many honors both in his own country and in Europe.

Holmes' principal works were: *Volumes of poems*—'Songs in Many Keys' (1861); 'Songs of Many Seasons' (1874); 'The Iron Gate' (1880). *Novels*—'Elsie Venner' (1861); 'The Guardian Angel' (1867). *Essays*—'The Autocrat of the Breakfast Table' (1857–58); 'The Professor at the Breakfast Table' (1859); 'The Poet at the Breakfast Table' (1872); 'Over the Teacups' (1891). *Memoirs*—'Memoir of John Lothrop Motley' (1879); 'Life of Ralph Waldo Emerson' (1884).

Holy Roman Empire. It was on Christmas Day of the year 800, when Pope Leo III in the church of St. Peter's in Rome placed a crown on the head of the Frankish king Charlemagne as he knelt in prayer, that the peculiar organization which we call the Holy Roman Empire first came into existence (*see* Charlemagne). Amid the breakup of the Frankish kindgom after Charlemagne's death, the Empire for a time disappeared. It was revived by the Saxon Otto I, king of Germany, in 962. From that time until its final abolition in 1806, the Empire maintained some sort of existence; but in its last three centuries it had become, in the language of the witty Frenchman Voltaire, "neither holy, nor Roman, nor an empire."

In theory the Holy Roman Empire was the counterpart in civil government of the universal Catholic

church in religion. Just as God had placed the Pope over his church, so, it was reasoned, he had placed the emperor over all kings and princes. In practice the Empire after 962 included only Italy and Germany, and a wavering connection with Lorraine, Burgundy, Switzerland, and the Netherlands.

In theory the empire was elective. The Golden Bull of 1356, issued by the Emperor Charles IV, placed the hereditary right to elect in an Electoral College composed of the Archbishops of Mainz, Cologne, and Treves (Trier), the King of Bohemia, the Count Palatine of the Rhine (Pfalzgraf), the Duke of Saxony, and the Margrave of Brandenburg (Bavaria and Hanover were added later). In practice the election was practically hereditary in some one princely house for considerable periods. After the Carolingian and Saxon lines, the imperial crown was worn by the members of the following houses: The Franconian or Salian house (1024–1125), the Hohenstaufen (1125–1254), [Great Interregnum, 1254–1273], various houses (1273–1347), the Luxemburg-Bohemian Line (1347–1437), the Hapsburgs (1438–1806, except for one reign, 1740–1745). For further details *see* the article Germany and the biographical articles.

HOME ECONOMICS. Imagine the tasks that confronted the housewife of a century or two ago! She must not only make the clothing for the entire family, but she must also spin the yarn and make the cloth itself. Besides preparing every article of food, she must churn the butter by hand and must even make the soap and candles for the household. In fact she must do a thousand and one things that are done in factories and by machinery for the woman of today. It is little wonder that in those days training in household duties constituted a large part of a girl's education, and that her mother early began instructing her in the many tasks, large and small, which would fall to her lot when she undertook to manage a home of her own.

With the invention of various machines to lighten the housewife's burden, and the growing interest of women in politics, clubs, and various phases of social life which take them from household duties, less attention was paid to the accomplishments of the old-fashioned housewife, and girls were no longer trained in domestic affairs at home. And so the study of home economics, or domestic science, was devised by wise men and women and now constitutes an important department in most large high schools and in many colleges and technical schools.

Some of the main branches taught under this heading are cooking and dietetics, house sanitation, laundry work, sewing, dressmaking, millinery, history of costume, drawing, household design, household accounting, general household economics, and the care of young children. Emphasis is placed upon a mastery of the underlying principles rather than upon the acquirement of mere skill in the practice of any of these arts. While it is not necessary for the modern girl to learn to weave cloth, she must know enough about fabrics to buy wisely; and though she perhaps will not prepare every article of food, she must know what food elements the body needs, how foods should be prepared, and what the different kinds cost. The question of food, indeed, is one of the most important problems taken up by a student of household economics, and is a subject that is becoming vital and generally interesting. (*See* Cooking; Food.)

Then there is the question of sanitation and ventilation, which is equally important if the health of the family is to be preserved. A housewife must know the proper methods of cleaning, of keeping the plumbing in a sanitary condition; she must learn the importance of ridding the house not alone of roaches, but of flies and mosquitoes as well, and of keeping the house at the proper temperature and well ventilated. (*See* Heating and Ventilation; Hygiene.)

Though it is possible at the present day to buy every article of clothing ready-made, it is not always economical or satisfactory, and surely it is just as important for the modern girl to know how to sew and mend as it was for her grandmother. So a home economics course gives special attention to this branch of the art of home-making. (*See* Sewing.)

While the four main topics with which the study of home economics concerns itself are food, clothing, shelter, and home management, it draws information from many other fields for the solution of its problems —among them, history, economics, hygiene, chemistry, physiology, biology, and chemistry. A normal school course, to prepare teachers of the subject, lasts three years, and includes such educational subjects as psychology and the history of education, in addition to the technical work. (*See also* Nursing.)

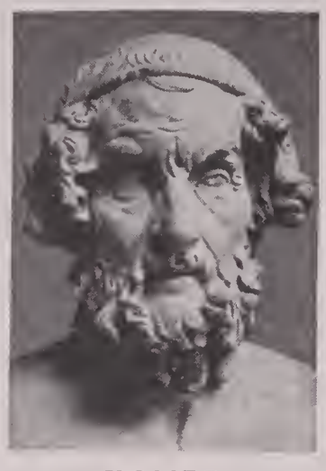
HOMER. There is no greater name in poetry than that which stands for the unknown author or authors of the famous epics of Greece, the 'Iliad' and the 'Odyssey'. According to the ancient historian Herodotus, Homer was an Asiatic Greek who lived about 850 B.C. But the Greek historians themselves differ as to when he lived and where he was born, thus giving rise to the saying:

> Seven cities contend for Homer dead
> Through which the living Homer begged his bread.

Tradition pictures him as a blind old man, who wandered from place to place reciting his poems.

Many scholars, however, hold that the poems were not composed by a single person, and were not written until centuries after they took the form in which we know them. It is almost certain that they were long handed down from memory, as there is little evidence that writing was practiced in Greece at so early a period. One theory of their authorship is that they are the work or compilation of a company of poets or minstrels, who composed, collected, and handed down in this form the legends of the Trojan War. The 'Iliad' and the 'Odyssey' are sometimes referred to different writers, and sometimes to early and later periods of Homer's genius.

But the question of the authorship of the 'Iliad' and the 'Odyssey' is of little importance beside the poems themselves, which are the greatest epics of any age or country. Later poets, both ancient and modern, and in all lands have paid homage to the master, whom Tennyson called "the Ionian father of the rest."



HOMER
The Father of Poetry

The Greek war about Troy forms the basis of the poems. The 'Iliad' tells the story of "the wrath of Achilles," while the 'Odyssey' relates the many adventures of Odysseus (Ulysses) on his voyage home. Even though the poems contain only a shadow of historical fact, scholars owe a great debt to them for the information they furnish concerning early life in the lands about the Aegean Sea. Excavations by Schliemann and others on the site of Troy and elsewhere have abundantly confirmed the information from the poems (*see* Aegean Civilization; Schliemann, Heinrich).

One does not need to be a scholar to appreciate the wonderful stories in Homer, for they appeal to all, young and old alike. The boy or girl who reads the poems in translation or paraphrase cannot miss the charm of the story, or fail to be interested in the heroic characters, as he follows them through the stirring battle scenes of the 'Iliad' and through the many and strange adventures of the 'Odyssey'. Only the student of the Greek language, however, can fully appreciate the simple and lofty beauty of the style of the original, the directness and vigor of the "winged words," and the flowing music of the long, hexameter lines.

The best prose translations of Homer are those of the 'Iliad' by Lang, Leaf, and Myers; and the 'Odyssey' by Butcher and Lang. One of the best known translations in verse is that of Pope, but his version conveys less of the spirit of Homer than do those of other translators. The American poet William Cullen Bryant made a poetical translation of great merit. Some of the Homeric stories are retold in these volumes. (*See* Achilles; Circe; Cyclops; Hector; Odysseus; Trojan War).

HONDU'RAS. The history of Honduras goes back to the days of Christopher Columbus, whose first landing on the continent was at Cape Honduras in 1502; but this Central American republic is still one of the least developed regions in the New World. In spite of its great mineral wealth, fertile soil, great forests, and other natural resources, few vessels visit its low, swampy, fever-stricken Caribbean shore except the banana boats that ply to New Orleans and Mobile, or tramp steamers seeking cargoes of logwood, mahogany, or hides. The chief center of settlement is on the Pacific Ocean side.

A coasting steamer brings you from San Francisco or Los Angeles to the Gulf of Fonseca, one of the finest natural harbors in the world, and comes to anchor off Amapala, on Tigre Island, the Pacific gateway to the republic. From Amapala a gasoline launch will carry you to the mainland, where starts the 85-mile highway to Tegucigalpa, for this healthfully located capital (population, about 30,000) is the only capital in the New World which still lacks railroad connection with the coast. You will find this a city of low white houses with tile roofs, lying in the bend of a small river, surrounded by beautiful wooded hills.

A rough journey of many miles over mountainous roads northward from the capital brings you to the terminus of the one important government railway in Honduras, running inland from the harbor of Puerto Cortez on the Caribbean Sea, which some day will connect the Atlantic and Pacific coasts. In the interior the climate is healthful and the high plateaus are dotted with small cattle and hog ranches. In the warmer valleys coffee and tobacco, both of high quality, are grown. The chief crop is bananas; mostly on the Atlantic coast. Other crops are corn, the staple food of the people, beans, rice, wheat, sugar cane, coconuts, henequen (sisal hemp), and indigo. Hides, rubber, and ivory-nuts are among the exports. Gold, silver, copper, iron, coal, and other minerals are abundant but development has been slight.

The population is chiefly of Spanish and Indian descent, with a mixture of negro and Carib blood on the north coast. In some of the less explored regions dwell Indian tribes, little more civilized than were their ancestors when Columbus landed. The area of the republic (about 44,275 square miles) is slightly smaller than that of Pennsylvania. Most of the surface is mountainous, with heights ranging from 5,000 to 10,000 feet.

The first European settlement in Honduras was established by Hernando Cortez in 1524. For three centuries it shared the fate of the other Spanish provinces in America. Since independence was gained revolutions and civil war have been frequent. In 1907 United States marines were compelled to intervene at the close of a disastrous conflict with Nicaragua. In recent years the government has shown a tendency to encourage agricultural and commercial development and to provide better protection for foreign investments. As a result new railway construction has been undertaken at several points. Population, about 640,000. (*See* Central America.)

British Honduras (formerly called Belize) is a British crown colony founded early in the 17th century at the lower end of the Yucatan peninsula by poachers on the Spanish logwood forests. Conflicts with Spain lasted until 1798, and it was only after the revolt of Central America from Spanish rule that Great Britain's rights were clearly recognized. Area, about 8,600 square miles; population, about 45,000; capital, Belize (10,000 population).

HONESTY

WE owe it to ourselves, to our neighbors, and to the world, to be honest. We must live with one another; the lives of others cross our own a hundred times a day, and there is no enduring happiness unless we treat one another fairly.

It is true, as the copybooks tell us at school, that honesty is the best policy. It will bring us hardships at times, but it will give us peace in the end. There are rogues and thieves who make fortunes; there are dishonest men who make a great noise and build up great wealth and seem to enjoy great happiness; but they live in no security, they are held in no esteem, and at any time the day after tomorrow may bring them clattering down.

It goes without saying that we must tell the truth—nothing but misery can come from falsehood. If men cannot believe us, they will have no dealings with us, or else they will deal with us as men who cannot be relied on. We depend on one another in all our daily lives. We depend on the truth of the timetable when we catch a train; we depend on the truth of a letter or a telegram; we depend on the word of our doctor or our druggist or our lawyer; we depend on a book that we consult for facts; we rely on a friend who tells us something he has seen. If we are not to believe all these, our lives are not worth living, for our time would be wasted, our facts would all be wrong; a false statement by a lawyer might bring us utter ruin, and a falsehood in a druggist's shop might bring us death.

We live and prosper by seeking and speaking the truth, and there is no other way to happiness. He who does not speak the truth will believe nobody else, and his life is one long round of uncertainty, haunted by the fear of being found out. Even though we suffer for it we must speak the truth. One lie leads on to another. A lie is like a snowball—it grows as it goes on its way. It leads a man from the shallows into the pit, from the marshes into the deep morass, and he is overwhelmed with shame and misery to find the sort of place a single lie will bring him to.

And, of course, we must pay our debts; we must not keep a tradesman waiting. We must not belong to that mean corner of the world which lives very well without much work, and flatters little tradesmen with its patronage, but forgets to pay its bills. Nor must we keep a tradesman waiting; he has his bills to pay as we have ours; and though the little bills we owe him may be small, the bills that he owes may be very big, and many an honest man has been ruined in this world by customers who would not pay their bills.

The honest man will seek no private ends in any public cause; he will be as honest to his country as to his neighbors and his friends. He will not put his trade, or his profit, or his personal advantage, before his country's interest. All through the politics and public life of every land runs the trail of dishonesty like that. There are men who care nothing for their country, but seek to win positions of power that they may serve some purpose of their own, and the good of the people and the welfare of the State are as nothing to them. Of all forms of dishonesty none is worse than this, for it corrupts a public cause, and thousands of people, or a whole nation, may suffer for one man's gain.

Nor will the honest man seek to protect himself unfairly from responsibility for what he says. It is right that a man should be responsible for his words, for words may be like poisoned arrows, and bring death or ruin in their train. What we have to say of a man let us say before his face as readily as behind his back. It is a wise rule and a safe one.

We should remember, when we speak, the spirit of those lines by Longfellow which show us how an arrow, or a song, or a word, may have an end we do not dream of:

> I shot an arrow into the air,
> It fell to earth, I knew not where . . .
>
> I breathed a song into the air,
> It fell to earth, I knew not where . . .
>
> Long, long afterward, in an oak
> I found the arrow, still unbroke;
>
> And the song, from beginning to end,
> I found again in the heart of a friend.

Let us be honest to all, to ourselves and to our country. Let us think ill of none without cause. Let us scorn to say the thing that is not true, scorn to take a mean advantage of another, scorn to repeat or even listen to the gossip of dullards and fools. So we bear ourselves worthily and need not to be ashamed, for "an honest man is the noblest work of God."

Honeysuckle. Clinging tightly to neighboring plants in tangled rocky woodland or winding its way up the sides of fence or garden wall, the twining honeysuckle abloom with yellowish white or crimson trumpet-shaped flowers is indeed a pretty sight. Its



The Honeysuckle is one of the most beautiful vines and is a favorite for decorating summer houses.

smooth oval dark green leaves make a fitting background in summer for the dainty sweet-scented blossoms, and quite as charming is their contrast with the bright red berries that appear in the autumn. There are over a hundred species, growing wild or under cultivation, scattered through the Northern Hemisphere. About 25 are native to the United States and Canada.

The familiar pale yellow and white honeysuckle (sometimes called the woodbine) that grows throughout the eastern states is a native of the British waysides and hedgerows. Another well-known variety, the evergreen or trumpet honeysuckle that bears scarlet or yellow blossoms in the spring, is a North American plant. Especially beautiful is the Japanese honeysuckle that opens its buds as daylight fades and with its delicious fragrance woos the large sphinx moths to drain its deeply hidden nectar. Certain other species—among them the winter-blooming honeysuckle of China, and the bush honeysuckle of North America—are dwarf shrubs rather than vines. To this group belongs also the twin honeysuckle that grows in moist cool woods from Pennsylvania to Michigan; it is a shrubby bush from three to five feet tall, with yellow funnel-shaped blossoms that grow in pairs.

The pink and clammy azaleas, though often called wild honeysuckle, belong to quite a different family, as does the columbine, to which also the name honeysuckle is improperly given.

Scientific name of yellowish white honeysuckle, *Lonicera caprifolium*. Flowers long, tubelike, borne in terminal whorls above united pair of leaves; calyx small, 5-parted; corolla long slender, with 4-lobed upper lip and narrow downward-curved lower lip; 5 stamens and 1 protuding style. Stem smooth, climbing. Leaves, upper pairs united around the stem, lower leaves opposite but not united. Fruit clustered red berries.

Hong'kong', China. In less than a century the island of Hongkong, England's first outpost in China, has been transformed from a desolate nest of pirates into one of the most important business centers in the world. Lying at the mouth of the Canton River, on the southeast coast of China, this island with its series of magnificent natural harbors is the great clearing point for the commerce of the Far East. Ships flying the flags of all the western nations there mingle with Chinese junks, Malay proas, and other strange craft of the Orient. The number of vessels, big and little, going in and out of this port is probably greater than anywhere else in the world; and their cargoes include tea and silk, sandalwood and ivory, opium and betel nut, coal and kerosene, as well as the more prosaic wares of the Occident.

The center of this thriving commerce is the settlement at the northwest corner of the island, officially called Victoria, but better known to sailors the world over as the city of Hongkong. Its streets rise terrace upon terrace up the sides of Victoria peak, which dominates the main harbor from a height of 1,825 feet. From this peak can be traced the fine military

PART OF HONGKONG'S BUSINESS SECTION



The great British seaport of Hongkong boasts of a business district of which London or Paris might be proud. If you did not see those coolies in their wide hats, you would never dream you were in China. Notice how the buildings project over the sidewalk, providing shelter against the hot sun and the downpours of the rainy season.

highway, 22 miles long, which encircles the island. Here and there on the rocky cliffs are placed batteries of frowning guns. Across the mile-wide strait is the Kowloon peninsula, jutting out from the mainland, which also forms part of the British colony of Hongkong. Everywhere along the shores of bays and inlets you see strings of houseboats and rafts where live the Chinese "floating population" — for it is a remarkable fact that nearly 60,000 inhabitants of Hongkong live in such habitations.

Hongkong island, which is 10 miles long and 2 to 5 miles wide, was ceded to Great Britain by China in 1842 following the Opium War. The Kowloon peninsula was added in 1861, and in 1898 Great Britain obtained a 99 years' lease to 376 square miles of agricultural lands stretching along the coast back of Kowloon.



HERBERT HOOVER
The Great Food Administrator of the World War.

The colony is ruled by a British governor and an executive and legislative council. Hongkong has a university and numerous schools for Europeans, Chinese, and East Indians. The chief industries are cotton-spinning, sugar-refining, ship-building, rope-making, and stone-quarrying. Important fisheries are established on the mainland. Hongkong is also the headquarters of the China squadron of the British navy. Population: Chinese, about 548,000; non-Chinese, about 15,000.

HOOKWORM. One of the great enemies of mankind is the hookworm, which infects more than half of the people of the warmer regions of the world—a quarter of the world's population. In many countries over 90 per cent are infected; in the southern United States, 3,000,000 of people.

"Hookworms! What kind of monsters are they?" you ask. About the size and shape of a half-pin, pointed at both ends. The head end is hooked, and anchors the hundreds or thousands of small parasites into the soft lining of the intestine of man. The many small wounds thus produced usually cause loss of blood, with emaciation, "laziness," and general inefficiency. Children remain undeveloped and in some cases a person of 20 looks like a stunted child of 12 or 14. The weakened condition of persons infected with hookworm makes them especially susceptible to tuberculosis and other germ diseases.

The young hookworms live in soil which has been polluted and infected by the intestinal waste from persons suffering from hookworms. They enter through the bare feet, get into the blood stream, and pass by way of the heart and lungs to the intestine, where they lodge, grow, and mature. Their eggs pass from the intestine with the waste, to infect new places and other people. A simple, inexpensive, speedy, and efficient method of treatment has been used by physicians for some years. There are two slightly different species of hookworm, belonging to the *Nemathelminthes* or roundworms.

HOOVER, HERBERT CLARK (1874–). At the beginning of the World War, in 1914, the name of Herbert Hoover was known only to a few persons as that of a remarkably successful mining engineer. At its close little children had learned to lisp his name in every land of Europe, as well as in the United States and he stood out with General Pershing and President Wilson as one of the three greatest Americans called forth by the world conflict.

Hoover's war services began in 1914 with his organization of a committee in London to care for Americans who were stranded abroad by the outbreak of hostilities. When Belgium was threatened with starvation, following the German occupation, Hoover organized the Commission for Relief in Belgium (the famous "C.R.B."). It was financed by Belgian, British, and French subsidies, and by private contributions; and the United States government advanced vast sums to carry on its humane activities. It grew from nothing but the promises to pay of Hoover and his friends, until it had a fleet of over 70 ships and was spending $17,000,000 a month. For four years not less than 8,000,000 people in Belgium and occupied France were not merely fed and clothed, but saved from actual starvation and death, by this commission.

When Germany's submarine sinkings forced the United States into the war and made food a main issue, President Wilson called Hoover to Washington and made him Food Administrator (August 1917). His work in this position, with his slogan, "Food will win the war," is remembered in every household in the land. After the armistice he went to Paris as the administrator of a large fund appropriated for feeding the war-torn lands of Europe, and as a member of the Supreme Economic Council of the Allies. Between December 1918 and June 1919 about 20 countries—including Belgium, northern France, and practically all of Europe east of the Rhine—received food and other aid, including assistance in the rebuilding of industries, the organizing of a basis of exchange between countries whose currency systems were disrupted, and the care and exchange of prisoners. Over three million tons of food and other supplies, valued at $770,000,000, were distributed by him, chiefly to suffering women and children.

Herbert Hoover was born in West Branch, Iowa, in 1874, the son of a man who was both a farmer and the village blacksmith. His parents and relatives were all strong in the Quaker faith. The father died when Herbert was four years old, and at eight he lost his mother. After some years spent with uncles and aunts in the West, he was sent to Oregon and

found a home with other relatives at Newberg. Here he formed an ambition to be a mining engineer, and at 14, when his relatives wished to put him in an orthodox Quaker institution, he declared his intention to attend a "scientific university." So to Portland he went, worked hard, saved, and studied for his university career.

In the summer of 1891 he entered Leland Stanford Junior University from which he was graduated in 1895. After working a year as a miner he obtained a position with a mining engineer, and it was not long before he was executing important commissions. From 1902 until 1914 Hoover came and went the world round, from mine to mine, with ever-growing reputation as an organizer of industry and an expert in metallurgy. China, the Malay Peninsula, Korea, Central and South America, Australia, Russia, and the United States shared his attention. When the outbreak of war in 1914 completely altered his work, he gave up a private business in which 150,000 men were working under him.

So great was his reputation as an able business man of high principles and skill in handling the greatest problems that he was seriously considered for the Republican presidential candidate in 1920. It was with general popular approval that President Harding made Hoover Secretary of Commerce.

Hops. When the green conelike blossom clusters of the hop vine take on a yellow tinge and rustle like paper flowers, the hop-grower rushes his pickers into the field, for the value of his harvest depends on gathering this flower-fruit in the "nick-of-time." The yellowish aromatic resinous substance called "lupulin," which is contained in the fruit, deteriorates rapidly, and it is this substance which gives hops their medicinal and industrial value.

The hop is a perennial climber which each year produces several twisting stems that reach a length of 15 to 20 feet. It will not grow horizontally, but clings without tying to upright wires or poles. Hop fields, therefore, are provided with high trellises, so arranged that the vines may be let down for convenience of the pickers. It is a curious fact that hop vines always twine in a right-handed spiral, in the same direction the hands of a watch move.

There are male and female plants, but the best hops come from fields where only female plants are grown. This prevents seed production, which would detract from the value of the fruit. Plants grown from seed are not "true to type." For commercial purposes, therefore, hops must always be propagated by root cuttings or by sets.

Since the principal use of hops is in making beer, hop growing is carried on most extensively in Germany and Central Europe, where beer is the commonest beverage. The Bohemian hops are particularly noted for their excellence. England, France, and Belgium also produce large crops. The principal hop fields in the United States are in New York state and on the Pacific Coast.

The hop belongs to the nettle family. Leaves heart shaped, 3 to 7-lobed; flowers in panicles. Scientific name, *Humulus lupulus.*

Horn. There are two kinds of horn, one the continued growth of the actual bone structure, the other a hardening of the epidermis or outer layer of the skin. Corns that grow on our toes when we wear tight shoes, the hard spots on a camel's knees, the tortoise's shell, the scales of snakes and lizards, birds' beaks, horses' hoofs, the horns of sheep and cattle, and the finger and toe nails of man and animals, are examples of the latter, which is the true horn substance. It is closely related in growth and composition to hair, and is made up of about 50 per cent of carbon, with hydrogen, oxygen, nitrogen, and sulphur.

The deer's "horns," or "antlers," are examples of the other sort of "horn," which is really a bone outgrowth. During their growth period such "horns" are covered with a sensitive velvety skin, which later peels off, leaving the long, hard, solid antlers; these are usually shed once a year.

Beneath the sheath of true horn in the case of oxen, sheep, and antelope we find frontal bone outgrowths constituting a sort of core. Except for those of the pronghorn antelope, such horns are never shed. Neither are those of the giraffe and rhinoceros, which are thickened hardened masses of skin and hair, covering independent bones. Horns may be either solid or hollow; in the latter case they are generally found on the female as well as the male.

Early man used horn for weapons, handles, drinking cups, etc.; then for musical horns, powder horns, and the like. Since true horn can be softened and split into thin sheets which are tough, pliable, semi-transparent, and easily molded, many articles both useful and ornamental have been made from it. By a dexterous mixing of dyes, common horn can be made to look like expensive tortoise shell. Formerly thin horn plates were used in window panes, lanterns, and for similar purposes. Horn is still used in making combs, buttons, the handles of umbrellas, canes, knives, forks, spoons, etc.

Horn, Musical. The horn is a gallant instrument. From its very beginning it has had to do with soldiers and warfare; it has been the companion of brave knights, and has brought timely aid to many a hard-pressed warrior.

The first horns used in music were rams' horns. From these natural hollow tubes it was a short step to hollow tubes of brass. In time these were improved by the addition of valves, worked by keys that shortened or lengthened the tube, thus making it possible to produce any note of the scale. By varying the shape and width of the tube, of the mouth-piece, and of the bell (the flare at the end), various types of horns have been developed.

In the modern orchestra only the French horn is technically called a "horn." The trumpet, cornet, and trombone are spoken of as "trumpets." The powerful tubas are the tenor and bass instruments

of the brass group. The saxhorns, which are chiefly used in military bands, are keyed instruments with long winding tapering tubes, made in several sizes. They get their name from a Belgian, Adolphe Sax, who invented them. The euphonium is a small bass instrument of the saxhorn type.

Each of these instruments has its own interesting history and its own distinctive quality. The French horn gets its graceful shape from the fact that it was once a hunter's horn. Straightened out, it is from 7 to 10 feet long. Imagine a hunter riding to the chase with such an incumbrance! The tube of the horn was bent in a circle large enough for the hunter to slip over his head, and in this way he carried it to the chase.

The trumpet's brilliant and penetrating voice is due to its long narrow tube, 8 feet in length; it is only three-eighths of an inch in diameter until within 15 inches of the bell.

This tube is usually bent back upon itself to make it more convenient to handle. The circling or bending of a tube makes no difference in the tone, so long as the air space inside is undisturbed. The trumpet is very difficult to play and therefore the cornet usually takes its place.

The cornet is the smallest of the brass instruments generally employed, for its 4-foot length is bent into a short space. For all its small size, it is the most important member of most brass bands, and fills a useful place in the orchestra. Its characteristic feature is its three pistons, which vary the length of the vibrating air-column and thus enlarge its compass.

The sliding trombone is the curious instrument that the performer plays by reaching out and drawing in his arm, as he lengthens and shortens its tube to make the different tones; for, in place of keys, it is fitted with overlapping slides.

THE TRUMPET ECHO OF THE CENTURIES



This painting by Sir John Gilbert shows a cavalier sounding the war trumpet. To the ear of the historian that trumpet call goes echoing down the centuries to the time of the Romans; for the cavalry trumpet you see here was simply the cavalry trumpet of the Romans in another form.

Although the tuba is the deepest voiced of all the brass instruments, it produces rich tones and its great voice can be made both soft and sweet. Its long cone-shaped tube is bent and rebent before it finally ends in the great flare that gives it such a look of weight. Like the cornet, it is played by valves.

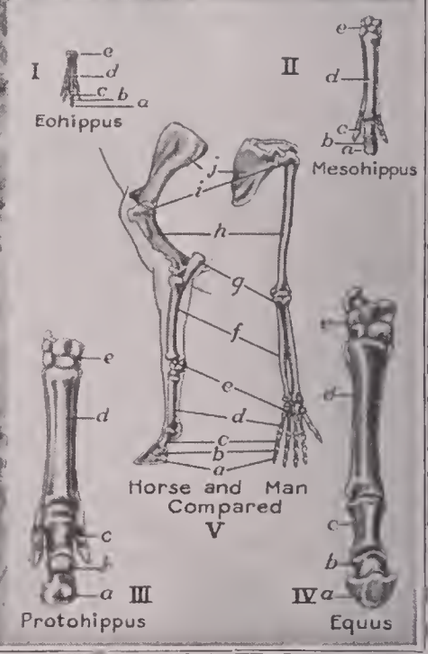
The saxophone, an invention of the same man who invented the saxhorns, is a strange instrument of brass fitted with a mouthpiece containing a reed, like the clarinet. It is one of the important instruments of the military band, and is often employed in modern popular music because of the laughable effects that can be produced with it. (*See* Musical Instruments; Orchestra.)

HORNBILL. Great beaks, surmounted by bony crests or helmets, and prominent eyelashes distinguish these queer bulky birds (*Bucerotidae*) of Africa and the Malay region. Their food consists mainly of fruit and insects, but those of the larger species (about four feet long) kill and devour the largest and deadliest vipers. The hornbill breeds in holes in trees, plastered up with mud by the male until only a small window remains. Through this he passes food to the female and young.

HORNET. Several large members of the wasp family are called hornets. They are social insects, building nests of paper-like pulp. Their thick bodies are usually black or dark brown, marked with brilliant white or yellow, which has earned for some of them the name "yellow-jackets." If their nests are attacked, they show a disposition so irritable and wield a sting so painful that they fully justify the common expression "as mad as a hornet." If left alone, however, they are interesting and industrious workers. They do some damage to fruit, but make up for it by the harmful insects they kill. (*See* Wasps.)

THE HORSE AND HIS GEOLOGIC ANCESTORS

That little creature at the very top was the first of all horses. He lived ages and ages ago and was about the size of a cat. *Eohippus* we call him today and from his remains we learn that he had four toes on his front feet and three on his hind feet and that he must have looked very much as the artist has pictured him here. Next comes *Mesohippus*, a larger animal who had lost one of his toes in the course of ages. Still later in horse history is *Protohippus*, who had "learned" to stand on one toe, his other toes becoming very small. Last of all is the modern Horse (*Equus*), who has lost all but the faintest traces of his ancestors' additional toes. The drawings at the lower right show plainly the steps in the evolution of the horse's front foot (I, II, III, and IV). In the middle (V) the comparison is drawn between a horse's front leg and a man's arm. The same letter is used in each of the five drawings to designate the corresponding parts. Thus *e* indicates the man's wrist, and also what we call the horse's knee. These two are really the same structural parts and we may say that the horse is in fact standing upon one "finger," the nail of which (*a*) has become a hoof.



In very ancient times, all four-footed animals were "plantigrade"; that is, they walked upon the whole soles of their feet with their heels touching the ground as men and bears and elephants do today. In the course of time however there developed animals who "got up on their toes" in the manner of the horse illustrated here. Such "toe-walking" (digitigrade) animals, including creatures like deer, rabbits, mice, etc., and beasts of prey of the cat and dog tribes, became much swifter of foot and were better able to escape their enemies or overtake their prey. Thus they survived in the struggle for existence, while the "plantigrade" creatures, except those of great strength like the bear and the elephant, or of great intelligence like man, perished in the struggle for existence.

For any subject not found in its alphabetical place see information



HORSE. The beautifully proportioned form of the horse and its intelligence, docility, and affection have made it man's best-loved animal friend, with the possible exception of the dog. From the earliest times of man's history we know that he used the horse, first as a source of food and later as an aid in war and a beast of burden.

The horse and other members of the horse family, the ass and the zebra, are also especially interesting because scientists have been able to trace their history more completely than that of any other animal group. So many fossil skeletons of horses have been discovered, in all parts of the world, that we know the history of its development for a vast period of time—some say as long as 2,000,000 or 3,000,000 years. We know that the remotest ancestral horse was a tiny animal about the size of a cat, with five toes on each forefoot and four on each hind foot. Fossil remains of early horses (named *Eohippus*, or "dawn horse") have been found in Wyoming and New Mexico, with four complete toes on the fore feet and three on the hind. As we follow down the series of fossil skeletons, we can see these little animals took to running on the tips of their toes to escape their enemies, and how gradually they came to throw more and more weight on the center toes. With each generation, therefore, these toes became stronger and the unused toes became weaker and finally disappeared (*see* Evolution; Foot).

That is why the horse now has only one toe on each foot. The hoof which encases it is just a greatly enlarged and thickened toe-nail. Traces of two of the lost toes may be found in the splint-bones which grow on either side of the cannon-bone of the feet. The upper joint of the toe has also become much larger and stronger. It is known as the "fetlock." The joints that are usually called the knees of the horse correspond to the ankles and wrists of a human being. The true knees and elbows are concealed within the body of the horse but they may be seen clearly when it is in motion.

The horse has a symmetrical form, strong limbs, a long head with large lustrous eyes, small pointed ears which it can move, and wide-open dilating nostrils. The neck is long, the body rounded and fleshy; the hair is soft and short, and lies close to the body, growing into long coarse strands in the mane and tail. The mane falls in graceful waves down one or both sides of the neck and over the face. The tails of the ass and the zebra are tufted at the ends, but in the horse the long hairs grow from the base and sides as well as from the tip.

The horse eats grass and grain but does not chew the cud. It has from 36 to 40 teeth—three incisors, or cutting teeth, and six grinders on either side of both jaws. In addition to these the males have four small canines, or dog-teeth. Between the canines and the grinders there is a space where the bit is placed, an arrangement by which alone man has been able to subdue this vigorous animal.

The colt is born with its eyes open and its body fully covered with hair. It is able to stand and walk a few minutes after birth. Within two weeks the "nippers," or central teeth, make their appearance. Other teeth soon follow and when the colt is about six months old it has a full set of milk-teeth, which it

begins to shed during its third year. The dog-teeth, or canines, make their appearance, but only in the males, during the fourth year, and when the colt is five years old its set of permanent teeth is complete.

ONE OF THE FAMOUS SHIRES



The Shires, whose native home is in the heart of England, are the largest of all horses. They have a heavy covering of shaggy hair from the hoofs to above the knees.

The growth and changes in appearance of the teeth are so regular up to the tenth year that the age of the horse may be judged by them, but after the tenth year these annual changes cease. During its second year the colt's hair loses the curliness which distinguishes its first season, and becomes more lustrous. The hair, except the mane and tail, is shed annually in the spring. In the fall it grows longer and forms a warm winter coat.

From the piles of horse-bones found in the haunts of the early cave men we know that the wild horse was first pursued for food. As a tamed servant of mankind the horse was unknown to Egypt of the Pyramid Age (3000–2500 B.C.), and to the Babylonians before 2100 B.C. The first to tame the horse were Aryan (Indo-European) peoples who inhabited the vast grass-lands that stretched north of the Caspian and Black seas.

All the early monuments and records indicate that for many centuries the horse was used chiefly to draw chariots in war, and was not ridden. As beasts of burden the ox and the ass were used long before the horse.

Several species resembling the horse and the ass are still found wild in central Asia, such as the "kiang" and "onagar." Zebras and wild asses are also found in Africa, in the deserts of Syria and Persia, and in the central plains of India. (*See* Ass.) When white men first came to America the horse was entirely unknown to the natives and increased their awe of the newcomers. The wild horses later met with in South America and the mustangs or Indian ponies, which until quite recently ranged wild over a great part of western North America, are descendants of tamed horses that escaped from the Spaniards in the 16th century. Likewise, the wild horses of Australia are descended from stock imported from Europe.

By careful breeding and crossing of the different stocks, a great many varieties of horses have been produced, ranging in size from the London cart horse, which attains six feet, sometimes seven feet, at the withers, or highest point of the shoulder, to the Shetland pony, which sometimes is less than three feet in height. There are three main types of horses: the heavy draft horses; the tough, shaggy varieties; and the slender rapid travelers.

Most of the ordinary horses of northwestern Europe are descended from the ancient dun-colored Norse horse. The ancestors of our modern draft horses were first bred as war horses, because a very large and powerful animal was needed to carry the huge weight of a mail-clad knight. Varieties from France, Bel-

THE TINY HORSES FROM THE FAR NORTH



We'd be very glad to wear our hair long like that if we were Shetland Ponies and lived up on those cold islands off the northeastern coast of Scotland. In warmer climates Shetland ponies do not grow such thick shaggy coats.

A FAMOUS RACE HORSE



This is the famous race horse "Man o' War." Notice his fine, clean, lean head and his long muscular neck.

gium, and Germany were long ago imported into Great Britain, where some of the most famous modern varieties originated, such as the Cleveland Bay, the Shire, and the Clydesdale. The Shire, which has been bred for centuries, is of immense weight — from 1,800 to 2,200 pounds — with a plentiful covering of long hair extending around the front of the short stout legs. The magnificent Clydesdale, a Scottish breed named from the valley of the Clyde, not quite so large, is noted for its activity, strength, and endurance. The Percheron, a carefully bred French variety noted for its strength and endurance, is the most popular draft horse in America.

Those Dear Little Shetland Ponies!

The Shetland pony is a diminutive creature, a product of the cold, barren Shetland Islands off the northern coast of Scotland. Its small size is doubtless due to generations of battling against adverse physical conditions in its native haunts. It possesses great strength for its size, will fatten on almost any kind of food, and is patient and gentle. It possesses a fine head, a long shaggy mane, and a beautiful bushy tail.

The Arabian steed is the ideal horse. It is noted for its fleetness, its graceful proportions, and its intelligence and docility. The Arab loves and fondles his horse as he does his child, and man and beast understand each other perfectly. The owner of a brood mare carefully selects for her as a mate a stallion of unblemished descent. The mare and colt live in the tent with the Arab and his children. Marvelous stories are told of the devotion to each other of the Bedouin and his steed.

It has lately been shown that the original home of the Arabian horse was not the country for which it was named. The Arabs used no horses until after the Christian era. The Egyptians, however, as early as 1500 B.C., possessed horses which appear to have resembled the modern Arabian horses, while those that appeared in Babylonia, Palestine, and Greece about that time were coarse thickset animals. Classical literature, moreover, proves that about 1000 B.C. North African steeds were highly esteemed and eagerly sought for by the nations of the Mediterranean area, among whom they were famous for swiftness of foot. The Barb from Morocco is perhaps as famous as the Arab itself, and the historically noted Irish hunters were derived from Spanish horses of Barb descent.

The thoroughbred running race horses are descended from the Arabian and the Barb and are carefully bred for speed. The marvelous improvement in this direction indicates what can be accomplished by proper selection in breeding and systematic training. Trotting horses bred for speed are an American development. In 1818 the highest speed of a trotting horse was about one mile in 3 minutes. In 1859 this had been reduced to 2:19¾, and at the present time the record is under two minutes. The pacing record is lower still. These records were all made by American horses.

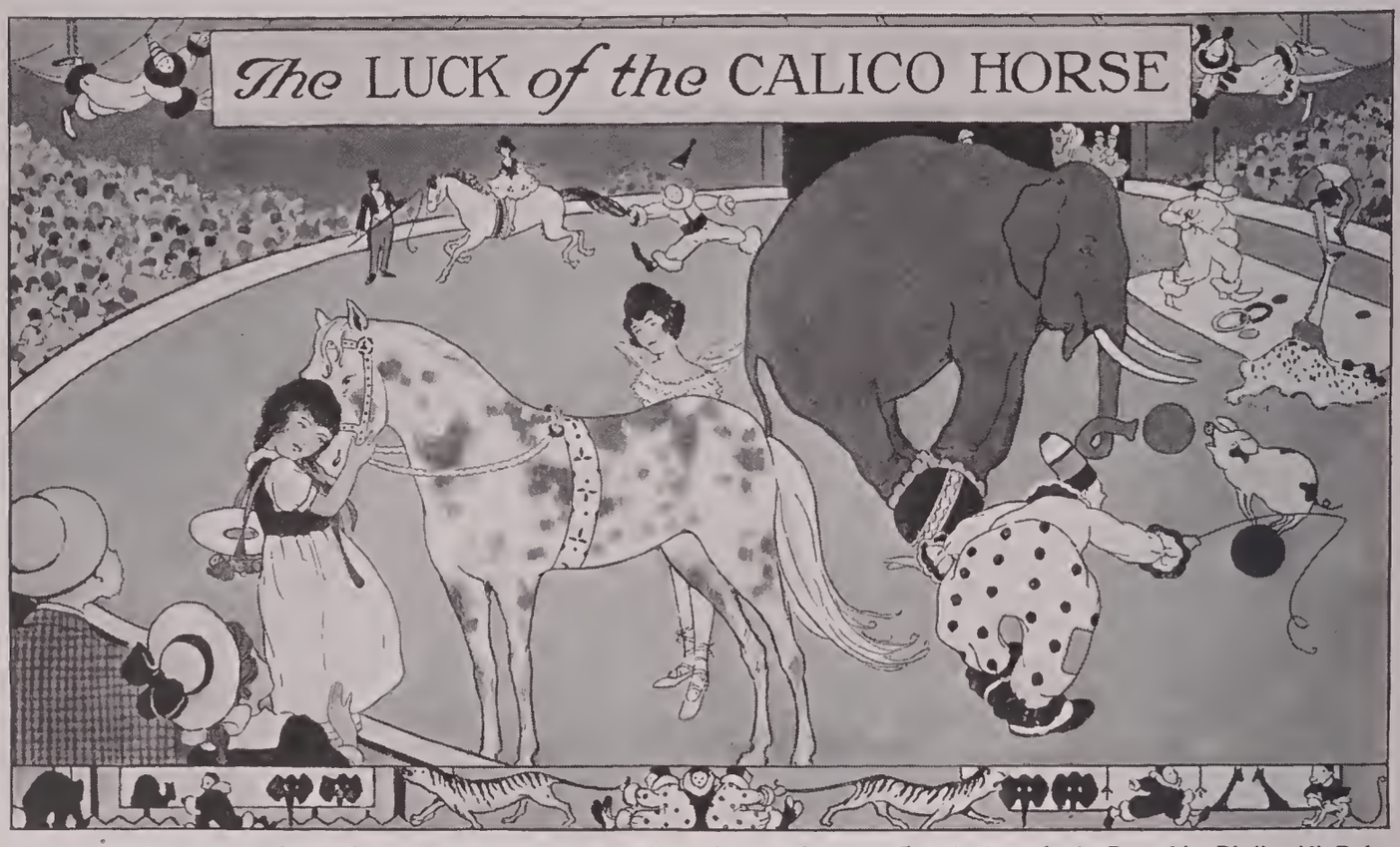
Except in the extreme Arctic regions, the horse is distributed throughout the world. Since the introduction of motor vehicles the number of horses in the United States has not increased as rapidly as in former days. Iowa, Nebraska, and Illinois are the banner states for breeding farm horses.

Scientific name of horse family, *Equidae;* of the domestic horse, *Equus caballus*. Normal life, 18 to 20 years. The molars are peculiar in that they grow up from the gums as fast as they wear off on the crowns, which are very long. The grinding surface is ridged by valleys filled with dentine and "cement."

THE ARAB AND HIS BEST FRIEND

This is an African Arab mounted on one of those Arabian horses, famous for their speed and endurance. The Arab looks upon his horse almost as a member of his family.





"Suddenly, above all the fun, a little girl's clear voice was heard, 'O papa, O mama, I do believe that's Pumpkin Pie!' Ali Baba pricked up his ears and whirled around. Then he trotted over to a box and poked his nose into the face of the little girl who had loved him on the farm."

THIS is the story of a horse that was like the Ugly Duckling in the fairy tale. People laughed at him or pitied him for a long time, but by and by they saved up their quarters and half-dollars and paid to see him.

When his mother, a handsome sorrel, had this new baby the farmer's family went out to the pasture to see him. The farmer's little daughter was so puzzled that she asked: "Which is it, papa, a colt or a calf?"

For the baby was a piebald or "calico" horse. He was creamy white all over, except where he was splashed with sorrel. And everybody knows that no proper horse is as spotted as a red and white cow! The farmer thought it did not matter what such a horse was named, so he called him "Pumpkin Pie."

How Pumpkin Pie Joined the Circus

It was soon plain that Pumpkin Pie never could be of much use on the farm. He had such small hoofs and slender legs that he could not pull a plow or heavy loads. He might have made a good buggy horse, for he could travel fast and was as gentle as a lamb. But no one likes to be asked if he has not made a mistake and hitched up the cow! Besides, he was so nervous and scary that it really was not safe for women and children to drive him. So Pumpkin Pie was allowed to spend most of his time in the pasture. He and the little girl were great friends. She fed him apples and stroked his nose.

One day when Pumpkin Pie was four years old, a circus came to the nearest town. The owners wanted hay to feed the horses, camels, and elephants. The farmer hitched up Pumpkin Pie with three other horses to haul a big load of hay to the circus.

The brass band, the shouting men, the flapping white tents, the red and gold wagons and cages, and the strange animals scared the poor calico horse almost to death. He reared and strained and plunged and snorted; his eyes bulged and turned red with terror.

Then suddenly he became quiet, and stood trembling. A little circus lady who rode horses and loved them had come out of her dressing tent to see what was the matter. She stood at his head and stroked his white velvet nose, and talked baby talk to him.

"Bless him, and was he scared? Zaidee wouldn't let old elephants and red wagons bite him. No she wouldn't!"

She popped a lump of sugar into his mouth and petted him. She noticed his small head and arching neck, his little hoofs and slender legs. Many show people think a "calico" horse brings good luck. In just five minutes that lady bought the horse.

"His name is Pumpkin Pie," said the farmer with a grin. "What are you going to use him for—a four-legged clown?"

She shook her head. "Come to the show next year," she said, "and see him."

Ali Baba and Mademoiselle Zaidee

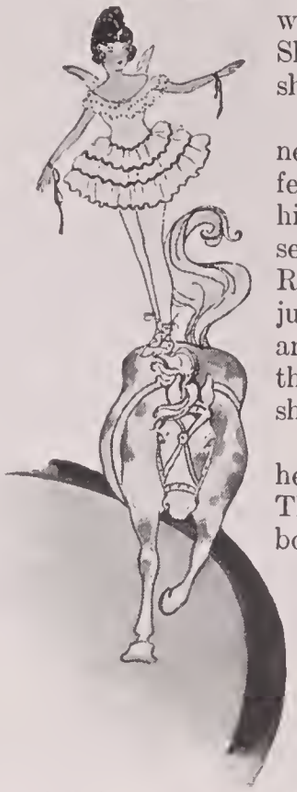
So poor despised Pumpkin Pie belonged to Mademoiselle Zaidee, the lady bareback rider. She named him Ali Baba for the poor woodcutter in the 'Arabian Nights', who found out the secret of the forty thieves.

That winter Ali Baba lived in a big training stable and yards in the South. He was fed and exercised and groomed but he had lessons to learn. He was taught to march in procession with a brass band and all the animals and performers. He was taught to gallop around a sawdust ring and obey every order of the ringmaster's cracking whip. He got used to seeing elephants stand on their heads, and men and women swinging in trapezes overhead. He loved the funny clown. He learned to change his step and keep time to music.

Every day he spent hours with his dear mistress, learning all the pretty things she wanted him to do. He was plump now, and had a nice, broad flat back. Mademoiselle Zaidee never put a saddle on him. She sat and stood and danced and leaped on and off his bare back, while he galloped around a ring with the easy motion of a rocking chair. When Ali Baba did very well she gave him sugar.

In the spring the circus went on the road. By and by it came back to the town where Ali Baba's mistress had bought him. When the big three-ring tent was full of people, and the band began to play, the procession marched in and around the middle ring. At the head of all, Ali Baba waltzed to the music with Mademoiselle Zaidee dancing on his back.

Ali Baba was just as spotted as ever, but among all the other queer circus animals he looked just right. Indeed, he was beautiful. His coat glistened like satin. His long tail and mane fell in white cascades. His hoofs were polished and fitted with silver-plated shoes. He had a silver bit. His bridle was braided of white silk cords. His mistress was dressed in white satin and tulle and silver spangles. She had silver wings on her shoulders, and she danced like a fairy.



"Round and round rocked Ali Baba, while his mistress leaped on and off his back."

No wonder Ali Baba arched his slender neck with pride and flung out his dainty feet in time to the music. Then he and his mistress had the middle ring to themselves. The music went faster and faster. Round and round rocked Ali Baba. He jumped hurdles. His mistress leaped on and off his back. She made flying leaps through paper hoops. When it was over she kissed her hands to clapping people.

Ali Baba bobbed his head, to show that he knew the clapping was partly for him. The clown pretended it was for him, and bowed and smiled. Then Ali Baba pushed the clown back and the people shouted and stamped their feet in glee. A bouquet was flung. He picked it up with his teeth and gave it to his dear mistress. Suddenly, above all the fun, a little girl's clear voice was heard, "O papa, O mamma, I do believe that's Pumpkin Pie!"

Ali Baba pricked up his ears and whirled around. Then he trotted over to a box and poked his nose into the face of the little girl who had loved him on the farm. The people clapped and cheered, and Mademoiselle Zaidee lifted the little girl to Ali Baba's back and the horse rocked around the ring with his old playmate.

HOSPITALS. Sick people—*really* sick people—are lucky today if they can be cared for in a good hospital. There they can have the expert care of the best physicians and surgeons, trained nurses in attendance when needed night or day, all the discoveries and appliances of modern science and skill to find out what the matter is and put it right, a specially trained dietitian to see that they have the proper food—in short, every comfort and care needed to give the best chance for recovery. Money cannot put into the most luxurious home the facilities for scientific care which the poorest can get in a good hospital.

The principles of modern hospital organization had their rise, through the genius of Florence Nightingale, out of the ghastly sufferings of the Crimean War, as did the profession of nursing, without which the modern hospital could not exist. A few years later the chemist Pasteur discovered the relation of germs to putrefaction, and the great surgeon Lister, applying Pasteur's discoveries to surgery, revolutionized operating room practice by the use of antiseptics. Almost every year since then has seen some advance, great or small, in medical science and hospital practice. And all of this is available to the poor as well as the rich. When a great English surgeon, famous for his practice in Guy's charitable hospital, wished to reassure the royal mother of one of his patients, he said: "Madam, his royal highness shall be as well cared for as if he were one of my patients at Guy's." More he could not say.

Most American general hospitals have, in addition to free wards, provision for paying patients in semi-private wards, and often luxuriously appointed private rooms. In the United States there are federal hospitals (chiefly for the army and navy), state, county, and city hospitals; public hospitals founded by private endowment; public and private hospitals supported by churches, industrial corporations, and fraternal and benevolent societies; and private hospitals run to care for the private patients of individual physicians and surgeons. The famous Mayo Clinic at Rochester, Minn., is a unique instance—originally a private clinic which, through the exceptional surgical ability and organizing genius of its two founders, acquired national and international reputation and was by them finally given to the state.

The United States has some of the finest hospitals in the world—and some of the worst. The American College of Surgeons has attempted to "standardize" American hospitals according to certain principles, of which the most vital are the following: adequate diagnostic laboratory facilities (because no patient can be properly treated until the doctor *knows* what is the matter); the keeping of adequate case records (because it is not possible to keep medical practice up to its highest level without proper "bookkeeping" on the treatment used and the results obtained); and prohibition of secret "fee-splitting" or division by the surgeon of his fee with the physician who sends a patient to him.

Several states now will not grant a license to practice to a medical graduate until he has spent a year or more as an "intern" in some recognized hospital, where he works under the supervision of the staff physicians and surgeons. Interns usually receive their maintenance but no salary, their services being regarded as a fair return for the educational value of the experience they gain.

Most general hospitals conduct training schools for nurses. A good hospital usually gives good training, but, in view of the difference in value of the training given by different hospitals—and particularly of the absolute worthlessness of training given by some so-called hospitals—it is wise to get very full information about a hospital from different sources before enrolling as a student (*see* Nursing).

Dispensary and outpatient work for patients not confined to bed is increasingly important in the general hospital. Pay clinics for people with small means who do not wish to be objects of charity have met a great need.

In addition to general hospitals, there are a number of hospitals devoted to special classes of disease, such as children's diseases, nervous and mental diseases, tuberculosis, cancer, etc. Sanitariums are for the residential treatment of chronic conditions.

HOUSTON, SAM (1793–1863). To Sam Houston more than to any other one person, the United States owes the possession of Texas, and Texas owes her independence from Mexico. He commanded the Texan troops at the battle of San Jacinto, Apr. 21, 1836, in which the Mexicans were defeated and the independence of Texas won. He presided over the convention which formed a constitution for the new republic, and as president of Texas, 1836–1845, he worked unceasingly for its annexation to the Union.

Houston brought to his work qualifications which rendered him especially fitted to the task. Although born near Lexington, Virginia, he had removed to the frontier in Tennessee at the age of 13, and for several years lived among the Cherokee Indians, by whom he was adopted. In the War of 1812 he rose from private to lieutenant, and formed a lifelong friendship with General Jackson, under whom he served against the Creek Indians in the battle of Tallapoosa (1813). All this fitted him to understand the frontiersman of Texas. And his training as a lawyer after resigning from the army, his experience as Congressman from Tennessee, 1823–1827, and as governor of that state during the next two years, fitted him for his service as constitution-maker and president of the Texan republic.

When Texas was annexed to the United States, in 1845, she honored Houston by electing him senator, a place which he held until 1859, when he became governor. It was against his influence that Texas seceded from the Union in 1861; and when he placed his allegiance to the Union above his loyalty to his state, by refusing to take the oath to support the Confederacy, he was deposed from office. Houston did not live to see the Union restored.

HOUSTON, TEX. Looking at the map you would not perceive that Houston is a seaport, for it is situated on a little crooked black stream called Buffalo Bayou, running up from Galveston Bay, 50 miles to the southeast. The federal government has widened and deepened this channel, at a cost of six and a half million dollars, enabling large ocean steamers to reach Houston and thus making the city a great shipping port for cotton, cottonseed oil, rice, sugar, lumber, petroleum, and petroleum products. It is almost the most important railway center of south Texas, and one of the greatest manufacturing cities of the whole state. There are extensive railway car shops, cottonseed oil, petroleum, and sugar refineries, planing and steel rolling mills, flour and rice mills, grain elevators, wood-working plants, and brick and tile factories.

Houston was named in honor of Gen. Sam Houston, being settled soon after his victory at San Jacinto in 1836. Following the example of Galveston, Houston adopted the commission form of government in 1905. It is the home of Rice Institute, one of the important educational institutions of the South. Population, about 140,000.

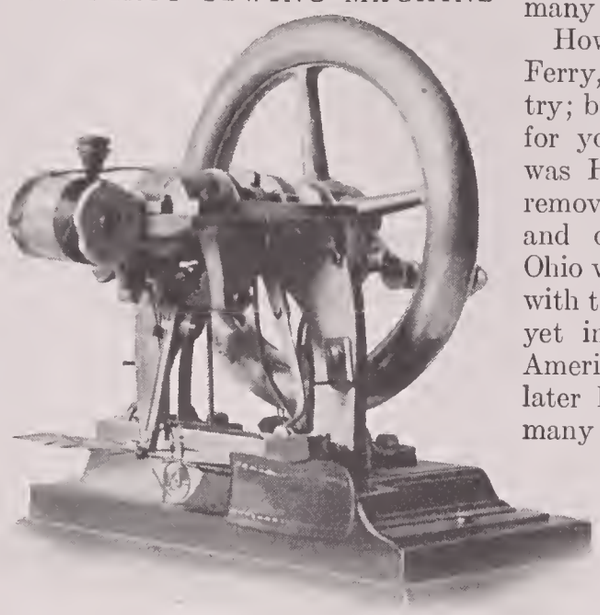
HOWE, ELIAS (1819–1867). If the women of the world were to take a vote on the person who had done most to lighten their labors, the name of Elias Howe, the inventor of the sewing machine, would be on many ballots. Yet in his earlier years he was often derided, and his machine was denounced as the enemy of the very class whose toil it did so much to lighten. For years Howe struggled on in poverty, being unable to sell his machines; and when his invention was finally accepted "sewing machine riots" occurred among many of the workers who believed that the machines would take away their livelihood.

Elias Howe was born in Spencer, Mass., where he lived with his father until he was 17, working upon the farm and in his father's grist-mill, and attending the district school during the winters. As a boy he was frail in health and slightly lame; but his physical weakness was balanced by an extra share of Yankee ingenuity. When he was given a task it is said that he always spent more time in finding a better way to do it than in carrying out instructions. At 17 he left

home to work in a factory for cotton machinery at Lowell. Later he worked in a machine shop in Cambridge, and then in Boston, where he married.

To eke out his salary of $9 a week, his wife sewed at home; and as Howe watched her stitching endless seams at night, he wondered if machines could not be made for sewing, as well as those for spinning and weaving, with which he was so familiar. In 1843 he began to work on his first model, and a year later he had completed a machine that would sew a fairly good seam. With money lent him by a friend he was able to perfect it and to obtain a patent. Then he tried to sell it. He pitted his stitcher against five seamstresses chosen for their speed, and they acknowledged that it sewed faster and better than all of them. Many people admired the ingenuity of the invention—but no one would invest a dollar in it.

THE FIRST SEWING MACHINE



That new suit of yours would have cost twice as much if it hadn't been for this little hand sewing machine which is now in the Patent Office at Washington. It is the model of the first sewing machine ever built.

Finally Howe tried to sell it in England, and succeeded in getting about $1,200 for his patent rights for Great Britain. After paying his debts he returned home penniless, to find that unscrupulous Americans had seen the value of his machine during his absence and that several imitations were on the market. He was forced to go to court to establish his rights in the invention, which were fully conceded in 1854. Then the money-making value of the sewing machine became apparent, and before Howe's death his royalties grew to $200,000 a year. He refused a renewal of his patent in 1867.

Howe was not merely an ingenious inventor but also a true patriot, serving as a private in 17th Connecticut volunteers during the Civil War. The hard life undermined his frail constitution, and he died in 1867. (*See* Sewing Machine.)

HOWELLS, WILLIAM DEAN (1837–1920). As "Dean of American Letters"—a title which he won in his later life through his long and distinguished services to literature—William Dean Howells was fond of recalling the days of his boyhood, when his father's printing-office was his school. His first attempt at literature, he tells us in his book of reminiscences called 'Years of My Youth', was not written but was set up directly in type and printed off.

Not counting these very youthful attempts as printer and journalist, but beginning with the publication of his first book, Howells' literary career covered a full 60 years. One of his first books was a 'Life of Lincoln' for the presidential campaign of 1860, and his literary activity continued unbroken up to the time of his death in 1920. He knew personally Longfellow, Hawthorne, and Lowell, in the golden age of American literature, and he outlived his friends Henry James and Mark Twain, and many lesser contemporaries.

Howells was born at Martin's Ferry, Ohio, of Welsh-Quaker ancestry; but the town which he described for young people in 'A Boy's Town' was Hamilton, to which the family removed while he was a lad. In these and other towns in the peaceful Ohio valley, he grew up in close touch with the quiet, simple, commonplace, yet interesting life of the average Americans of the Middle West, which later he depicted so realistically in many of his novels.

The very fact that Howells lived in the midst of this life might have prevented his seeing it in its true proportions, had he not had the opportunity of viewing it also from a distance. From 1861 to 1865 he was United States consul in Venice; and after his return to this country he was for a time on the staff of the *New York Times* and the *Nation*, and then removed to Boston, where for 15 years he was connected with the *Atlantic Monthly*, first as assistant editor and then as editor-in-chief. Returning to New York, he was associated with other leading American periodicals, chief of which was *Harper's Magazine*, for which he wrote 'The Editor's Easy Chair' from 1892 until the end of his life.

As a master of literary style Howells has few superiors. "For 40 years his English has been to me a continual delight and astonishment," Mark Twain once wrote; and another critic said, "He never wrote a bad page, never wrote a sentence that anyone else could make better."

As a novelist, Howell's strength lay not only in his easy style, but also in his fidelity to truth, the painstaking care with which he revealed the everyday life of the average American. He was a true realist, but unlike many of this school, he did not dwell upon the seamy side of life. Nor did he confine himself to novels, for he wrote a great number of amusing little farces, several volumes of verse, delightful familiar essays, books of travel, and much sound literary criticism. Not only in his writings, but through his fine sympathy and his sane and high-minded attitude toward literature and life, as critic and editor, as the friend and adviser of younger writers, he exercised a strong and wholesome influence on American literature. Although self-educated in the sense that he never attended college, he received honorary degrees from Oxford, Yale, Columbia, and

Princeton universities. He was president of the American Academy of Letters from its foundation in 1909, and in 1915 was awarded the gold medal of the National Institute of Arts and Letters "for distinguished work in fiction."

The following are a few of Howells' best novels: 'Their Wedding Journey' (1871); 'A Foregone Conelusion' (1875); 'The Lady of the Aroostook' (1879); 'A Modern Instanee' (1882); 'The Rise of Silas Lapham' (1885); 'Indian Summer' (1886); 'A Hazard of New Fortunes' (1889); 'The Kentons' (1902).

HUDSON BAY. Away up in northeastern Canada, a huge blue patch on the map, lies the third largest land-locked sea in the world. This is Hudson Bay—a mighty gulf whose icy waters cover 500,000 square miles, reaching up north into the Arctic Ocean by means of the Fox Channel and Fury and Hecla Strait, and out east into the Atlantic through Hudson Strait, a deep gorge grooved out of solid rock.

It is a lonely sea—this "Mediterranean of the North"—for, although never entirely frozen over, it is so obstructed by drift ice that only during summer can boats safely plow its icy waters, where—

> In the placid inter-ocean's swell
> The white whales blow and the porpoises dwell;
> And where the far north wind and sea
> Chant dirges of eternity.

In the short open season the Hudson's Bay Company's steamers find their way up there to load with millions of dollars' worth of furs. Then too the Indians living in scattered bands near the shore venture out after the vast shoals of seals, porpoises, walrus, and whales, and fish for the cod, salmon, and many other edible fishes, while here and there steam whalers worm their way through ice floes, and Eskimos' skin kayaks shoot out on the water like sea birds.

Save for a few trading stations and scattered settlements, the low shores—low except for certain high bluffs on the east and northeast—are the haunts chiefly of caribou and musk ox, of ducks and loons and ptarmigan. But it is believed that the whole region—whose soil and timber and minerals have as yet scarcely been drawn upon—will open up when Canada's new route to Europe is opened. This route, which will be nearly 1,000 miles shorter than any other for shipping the grain and cattle of the northwest to Liverpool, involves dredging a deep harbor in the bay, and building a $6,000,000 railway.

Thirty rivers flow into Hudson Bay, the Nelson, the Churchill and the Severn being the most important. The bay is about 70 fathoms deep and contains several islands, the largest of which is Southampton Island at the north end. The entrance is so near the Magnetic Pole that the compass needle is unreliable. The Cabots entered Hudson Strait in 1498, and several Elizabethan mariners during the following century did likewise. The bay itself was not explored until Henry Hudson reached its southern limit in 1610.

HUDSON, HENRY (1575?–1611). In the year 1910, three centuries after the great English navigator Henry Hudson had discovered Hudson Bay, a strange, bright-colored vessel lay anchored in the Hudson River, opposite the city of New York. It was a reconstruction of the little ship *Half Moon*, in which Hudson had braved strange seas and treacherous ice, and had explored the river on which was to arise this shining city, now doing honor to his name in the splendid Hudson-Fulton memorial celebration.

The ship was like some strange outlandish bird among its sober neighbors, the swift motor launches and gray steamers of our day. It was itself hardly larger than a good-sized launch, and the main deck was raised only a few feet above the water, so that except on the smoothest days the men must have remained between decks. The stern of the vessel rose in a steep poop and the bow was raised in a curve like a half moon, from which the ship perhaps took its name. In the dark narrow space between the decks, where the men lived, there was not room to stand erect or even to lie at full length.

To visit this vessel was to understand something of the hardships and dangers endured by the old sea adventurers; and something too of the conditions which led to the mutiny by which Hudson met his untimely end in one of the saddest crimes in history.

We know nothing of Henry Hudson's life before his four voyages between 1607 and 1611. All of these were made for the purpose of discovering northeast or northwest passages to China, to reach the rich trade of the Orient. His first and second voyages were for the Muscovy Company, an English trading company. During the first he explored the coasts of Greenland and Spitzbergen. During the second he reached Nova Zembla, trying in vain to force a passage through the ice-locked Kara Strait.

The third voyage, for which the *Half-Moon* was built, was for the Dutch East India Company of Holland. During it he explored the great river which bears his name, with the vain hope that it might lead to the Pacific Ocean. The last voyage was for an English company formed especially for the purpose. Again in the *Half Moon* he set sail in 1610, passed through the strait which bears his name, and explored and charted Hudson Bay. Winter overtook him, and he and his men endured terrible hardships from cold and lack of food on this inhospitable shore.

Discontent and mutiny smoldered, and in the spring broke out in a flame. Hudson was overpowered and, together with his young son, the ship's carpenter, and several sick men, was cast adrift in a small boat. The boat was never heard from again, and we can only guess at its ultimate fate, and the tortured love of that intrepid father, as he saw his son sinking into that death which he too must face. The ringleaders of the mutineers were killed by the natives. Others won their way back to England with Hudson's records, and were there tried for murder.

Hudson's services were of inestimable value in extending geographical knowledge, and they also bore fruit in developing the rich fisheries of Spitzbergen and the fur trade of the Hudson Bay region.

HUDSON CAST ADRIFT TO PERISH IN THE ARCTIC



"Hudson's last voyage was for an English company. Again in the 'Half Moon' he set sail in 1610, passed through the strait which bears his name, and explored and charted Hudson Bay. Winter overtook him and he and his men endured terrible hardships from cold and lack of food on this inhospitable shore. Discontent and mutiny smoldered and in the spring broke out in a flame. Hudson was overpowered and, together with his young son, the ship's carpenter, and several sick men, was cast adrift in a small boat. The boat was never heard of again."

contained in the Easy Reference Fact-Index at the end of this work

HUDSON RIVER. Fascinating legends, interesting stories of history, and picturesque scenery combine to make the Hudson River one of the most renowned rivers in the United States. The excellent harbor which its mouth affords has caused New York City to become the greatest city of the New World.

Rising in the heart of the Adirondacks in the northeastern part of the state, the Hudson is at first narrow, winding, and rock-obstructed, and then flows past wooded hills and cultivated slopes until it reaches tide-water at Troy. Here it is joined from the west by its chief tributary, the Mohawk. From Albany down it is like a long arm of the sea, broad, stately, and friendly. The Catskill Mountains, made famous by Washington Irving, rise in varied and mystic beauty on the west side of the river. Lower down the Hudson enters the Highlands, the scene of Arnold's treason and Andre's death, a region of ancient rock-ribbed hills and mountains. The United States Military Academy at West Point and the ruins of Fort Putnam are situated a few miles below. Emerging from the Highlands near Stony Point, where "Mad Anthony" Wayne stormed and captured the British stronghold, the river expands to form the Tappan Sea, near which was fought the Burr-Hamilton duel. The Palisades, a vertical wall of rock 300 to 500 feet high, majestic and awe-inspiring, extend for 20 miles on the west bank of the river reaching to the outskirts of New York City. The banks of the thronged waterway, once covered with forests, are now largely residential until the city's numberless docks and wharfs are reached and the river empties into New York Bay.

An Aid to Early Development

The Hudson River was first explored in 1609 by Henry Hudson, from whom it gets its name. In early days the name North River was often applied to it, in distinction from the Delaware or South River and this name is still given by New Yorkers to its lower part. Since the Hudson furnishes the only deep waterway through the Atlantic highlands open to large vessels, it greatly aided the early commercial and industrial development of New York. Before railroads were built it carried nearly all the traffic from the fertile country of the west and north. The first successful attempt at steam navigation was made by Robert Fulton on this stream, and with the opening of the Erie Canal from Troy to Buffalo in 1825 a continuous waterway connected New York City and the North Central states. Ocean-going vessels still travel up as far as Troy, where they are loaded with freight which has come by water from Duluth or other western points through the Great Lakes and down the Erie Canal. The falls and rapids furnish electric power which is used as far away as the coal fields of Pennsylvania.

HUDSON'S BAY COMPANY. Scattered over the vast northern regions of Canada, almost up to the shores of the Arctic Ocean, lie the fur-trading stations of the great Hudson's Bay Company. In those solitary outposts of civilization, which are still remote from the gradually extending transportation routes and where the sight of a new face is an event long to be remembered, agents of the company with their families live the same isolated lives which their predecessors have lived for more than two centuries. In the spring the Indians and half-breeds bring in the stock of furs accumulated by the winter's trapping, to barter for food, weapons, and clothing. These are then carried, in canoes or light-draft steamboats, to posts in Hudson Bay for transportation to England in the company's ships, or to railway terminals in the south, whence the furs go overland to some Atlantic port for shipment.

Boundless Wealth in Furs

The early history of northwestern Canada is the history of the Hudson's Bay Company and its rivals. Their trading posts were the first settlements in the western plains, around which many a thriving city has grown. The Hudson's Bay Company dates from 1670, when Prince Rupert of England set about realizing the visions of boundless wealth inspired by the success of Pierre Radisson, a French Canadian adventurer who had, seven years before, brought to Quebec a cargo of 60,000 beaver skins, worth half a million dollars. With 17 associates the prince obtained from his uncle, King Charles II of England, a charter giving them the sole rights of trade in the unoccupied lands which drain into Hudson Bay. It was many years before men realized the vast extent of this grant. No one supposed it included a territory more than a few hundred miles in breadth, and years of exploration were necessary before it was discovered that "Rupert's Land" included nearly all of the present provinces of Manitoba and Saskatchewan, a large part of Alberta, and even certain territory now a part of the United States.

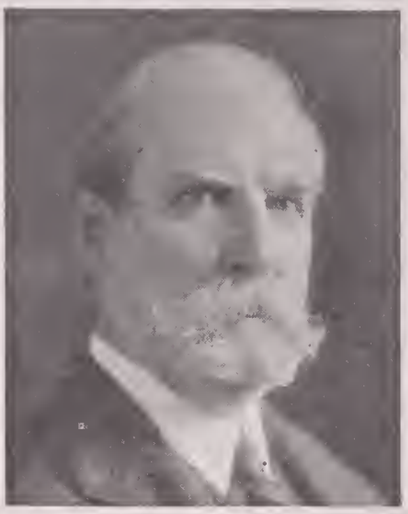
But vast as the company's holdings were, wealth did not come rapidly, at first, because the company had to contend with French rivals from Canada. With the acquisition of French Canada in 1763 this obstacle was removed, but a rival company—the Northwest Company—sprang up; and until the union of the two in 1821 their employees were sometimes engaged in actual warfare.

The Hudson's Bay Company had something more than mere trading privileges, for it owned the land and governed the people also. This arrangement was found intolerable when settlers moved into the region, and in 1869 the company was forced to surrender most of its privileges, though it was paid $1,500,000 and allowed to keep its forts and large tracts of land. It is today a wealthy trading corporation, with nearly 150 trading posts, although it no longer has the exclusive rights that it once claimed.

HUGHES, CHARLES EVANS (born 1862). A lawyer of national fame, governor of New York state, justice of the Supreme Court, and Federal secretary of state, Charles E. Hughes has been a national figure for many years. He was born in Glens Falls, N.Y.,

the son of a clergyman of Welsh descent. He received his A.B. from Brown University in 1881, then taught school while studying law, and going to New York City was graduated in law from Columbia University in 1884, being admitted the same year to the bar.

He first attracted wide attention in 1905–06 by the searching way in which he conducted the investigation for a committee of the New York legislature of the great insurance companies, in several of which scandals had become notorious. Before this Hughes had become a marked figure in New York state by a similar investigation of New York gas rates, then just concluded. He accepted the new commission on condition that he should be absolutely unhampered. His freedom from bias and his extraordinary capacity for analysis of monumental masses of detail, as well as for hard work—sometimes 20 hours a day — appeared in the results. Most of the recommendations made in the report he drafted were later enacted into law.



CHARLES EVANS HUGHES
Statesman and Reformer

Elected governor of New York state on the Republican ticket for two successive terms (1907–08, 1909–10), Hughes showed the same vigorous courage in forcing a reluctant legislature to pass various reform measures, which included an anti-race-track gambling law, a direct primary law, and particularly a law creating a public service commission, the outstanding achievement of his administration. He abolished "back stairs" influences, refusing private interviews to influential politicians; and "cleaned house" by eliminating honest but incompetent officeholders as ruthlessly as the corrupt ones, without regard to party services in either case. A firm believer in the party system, he was too honest, too uncompromising, and too deficient in the arts of popularity to become a party leader.

Governor Hughes resigned his office in 1910 to accept an appointment from President Taft to the United States Supreme Court—a position admirably suited both to his tastes and to his abilities. He ranked as one of the ablest men on the bench, and, so long as he sat there, he remained absolutely dissevered from politics.

It was undoubtedly much against his own inclination that he resigned his position on the Supreme Court bench to accept the Republican nomination for the presidency against President Wilson in 1916. The party platform was vague with reference to the war, and the campaign centered on bitter attacks on Democratic policies. Whether for this or for other reasons, many of Mr. Hughes' admirers felt that his campaign did not add to his reputation. He was defeated in November (*see* Wilson, Woodrow), and returned to the practice of law. In 1918 President Wilson appointed him to conduct the investigation of charges of extravagance and corruption in the building of airplanes for the army and navy.

In 1920 Hughes was favorably mentioned in many quarters for renomination, but for reasons of "political availability" he was passed by and Senator Harding nominated. After the overwhelming Republican victory, he was appointed secretary of state with universal approval, and from the beginning made a favorable impression by his able and conservative handling of the many difficult international questions with which he had to deal.

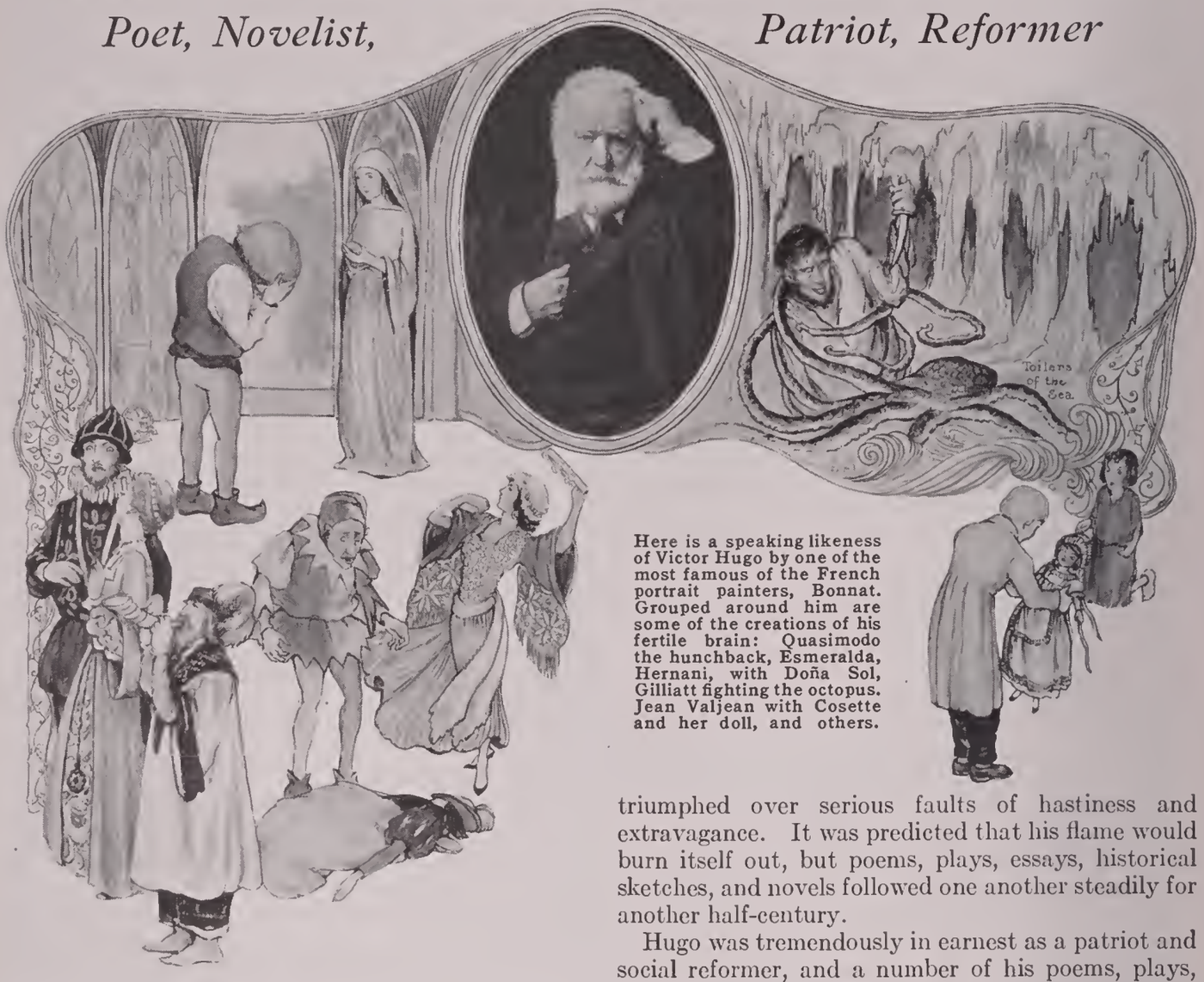
HUGHES, SIR SAM (1853–1921). As Canada's minister of militia and defense at the outbreak of the World War in 1914, Lieutenant-General Hughes raised and equipped for overseas service a very large part of the 600,000 men that Canada contributed in that gigantic conflict, and they were said to be among the best of all the British forces. A man of force and energy, he showed an ability in organization that amounted to genius. He recognized no obstacles, either for himself or others. If anyone complained that the task he set was impossible, his reply was: "Nothing is impossible. Do it."

Born on a farm in Ontario, of Protestant Irish stock, young Hughes enlisted in the militia in his 13th year, and at the age of 17 won a medal for service against the invading Fenians, who were seeking the overthrow of the British government in Canada. He was educated at the Toronto Normal School and Toronto University, and taught school for a number of years. Then he took up newspaper work, purchasing the Lindsay *Warder*, which he edited himself until 1897. In 1892 he was first elected to the Canadian House of Commons, and from that time he played a prominent part in public affairs. One of the principles he strongly advocated was that the Colonies should assist the Empire in time of war. During the South African War he offered his assistance in raising troops, besides serving in the intelligence and transportation departments. He was several times mentioned in dispatches.

Ever since his youth, he had made a special study of military affairs, and had risen in rank from private to lieutenant-general of militia. His political and military knowledge and experience fitted him for the office of minister of militia, to which he was appointed in 1911. In spite, however, of the splendid results he obtained as an organizer, and the esteem which he gained at first, his administration of the militia office was bitterly criticized. He was charged especially with being rash and arbitrary in his actions, and these attacks led to his resignation of his office in 1916. The British government rewarded him for his services by creating him a Knight Commander of the Bath.

TITANIC MASTER *of* FRENCH ROMANCE

Poet, Novelist, Patriot, Reformer



Here is a speaking likeness of Victor Hugo by one of the most famous of the French portrait painters, Bonnat. Grouped around him are some of the creations of his fertile brain: Quasimodo the hunchback, Esmeralda, Hernani, with Doña Sol, Gilliatt fighting the octopus. Jean Valjean with Cosette and her doll, and others.

HUGO, VICTOR MARIE (1802–1885). This prolific, versatile, and highly gifted writer, who was the greatest literary figure of France in the 19th century, lived in a heated period of his country's history. He was a fiery patriot and so much of his time and talents were given to political controversy. Born at Besançon in eastern France, the son of an officer of the French Revolution, Hugo's childhood was spent in Paris with his mother, in the splendid days of the First Napoleon, and in military camps in foreign countries. His mind and emotions were stimulated by public life, travel, and the atmosphere of glory which invested Napoleon's conquering armies, and the precocious boy wrote a tragic drama at 14. At 17 he took the French Academy prize for a poem, and at 22 was recognized as a master of the lyric and ballad styles of verse. In the full flower of his fame at 30, he headed a literary revolt from the classics, and founded the French romantic school of writers. Most of his followers are forgotten, but Hugo had such original ideas, command of language, splendor of sentiment, persuasion, and sense of melody, that he triumphed over serious faults of hastiness and extravagance. It was predicted that his flame would burn itself out, but poems, plays, essays, historical sketches, and novels followed one another steadily for another half-century.

Hugo was tremendously in earnest as a patriot and social reformer, and a number of his poems, plays, and works of prose fiction are impassioned criticism of the laws and social customs of his time. As a political opponent to Napoleon III, whom he nicknamed "Napoleon the Little," Hugo made himself so dangerous by his eloquence that he was banished from France. During 20 of his most productive years, while living on an island in the English Channel, he enjoyed a world-wide celebrity as "the Exile of Guernsey." There he wrote notable historical papers, rhapsodic memories inspired by personal sorrows, and novels that were translated into many languages. He was 60 years old when he wrote 'Les Misérables' (The Unfortunates), an epic work of fiction. "This," to quote the English poet Swinburne, "is the tragedy of life at its darkest, comedy at its brightest, humanity at its best and worst." Part of the story is summarized below.

Intense in everything, always at the boiling point of fervor, Hugo was often merely violent over the passing event, but he was, in several instances, carried away by passion to the point of inspiration on themes of universal interest. 'Les Misérables' is

For any subject not found in its alphabetical place see information

justly ranked with the greatest novels of all countries; 'Hernani' is thought to be his best drama, and 'Les Châtiments' is a collection of his finest lyrical poems. After the fall of the empire of Napoleon III in 1870, Hugo returned to Paris, where he lived a popular idol for another dozen years. His songs were set to music, his interdicted play 'Le Roi s'amuse' (The King's Diversion) was revived, and he was the chief figure of the French Academy. When he died at the age of 83, the Pantheon—a church in Paris dedicated as the tomb of illustrious men—was opened for the first time in 75 years for his burial. His funeral was one of the most impressive ever held in France.

Victor Hugo's principal works of fiction are: 'Notre-Dame de Paris' (1831); 'Les Misérables' (1862); 'Les Travailleurs de la mer' (Toilers of the Sea), 1864; 'Quatre-vingt-treize' (The Year 'Ninety-three), 1874. Poems and poetic dramas: 'Cromwell' (1827); 'Lucrèce Borgia' (1833); 'Marion Delorme' (1828); 'Les Orientales' (1829); 'Hernani' (1830); 'Le Roi s'amuse' (The King's Diversion), 1832; 'Marie Tudor' (1833); 'Ruy Blas' (1838); 'Les Châtiments' (1853); 'Torquemada' (1882).



FOR breaking into a shop and stealing a loaf of bread to feed his sister's famished children, Jean Valjean was sentenced to the galleys for five years. Several times he attempted to escape and failed; this added to the length of his sentence, until at last when he was released he had served for 19 years. And now that he was free his convict's yellow passport was enough to close all doors against him. No inn would give him lodging for pay and no home would receive him in charity! At last he was directed to the house of the bishop.

"See here!" he said when the door opened in response to his knock. "My name is Jean Valjean. I am a convict, I have been 19 years in the galleys. Since I reached this place I have gone from one inn to another. Everywhere they said, 'Get out!' Nobody would have me. I am tired and hungry."

"Put on another plate," said the bishop, turning to his housekeeper.

"Did you understand me? I am a galley slave—a convict. My passport says I am a very dangerous man. That is enough to have me kicked out wherever I go."

"This is not my house," said the bishop gently, "it is the house of Jesus Christ. It does not ask any comer whether he has a name, but whether he has a sorrow. Whatever is here is yours. What need have I to know your name? Besides, before you told me, I knew it."

"Really? You knew my name?"

"Yes," answered the bishop, "your name is My Brother."

That night after supper, Jean Valjean for the first time in nearly 20 years slept in a bed. Jean Valjean had been a peaceful man, but the unjust cruelties he had suffered had made a criminal of him. And now he arose and took a basket of silverware and fled.

Some hours later Jean Valjean was brought back to the bishop's house by three police guards. Again the good bishop saved him, for to him it was all a great mistake and the silverware was but a gift; and he reproached Jean Valjean for having left the candlesticks behind.

The officers released Jean Valjean.

"My friend," said the bishop, "before you go away, here are your candlesticks; take them." Then drawing near him, he said in a low voice, "Never forget that you have promised me to use this silver to become an honest man. Jean Valjean, my brother," he continued solemnly, "you belong no longer to evil, but to good. It is your soul that I am buying for you. I withdraw it from dark thoughts and from the spirit of perdition, and I give it to God."

But the struggle between good and evil was not yet over for Jean Valjean. Once he robbed a little lad of a small coin. Why he had done it, he could not tell, but when the boy had gone, Jean Valjean suddenly realized with a feeling of horror what a wretch he was. The words of the bishop came back to him, and for

the first time in 19 years he burst into tears. From that time forth he was a different man.

One day a stranger, who looked and spoke like a workingman, moved into the town of M— sur M—. In a few years he had not only made himself rich, but had built up the prosperity of the town. Father Madeleine, as the people called him, lived a quiet simple life, doing a multitude of good deeds as quietly as bad ones are usually done. At last, because of the services he had rendered and his high popularity, he was appointed mayor.

Javert, the Human Tiger

One man alone did not share the feeling of veneration which the people had for Father Madeleine, but looked upon him with a suspicious eye. This man was an inspector of police named Javert. He believed that he had seen Father Madeleine before. He continued to watch the mayor stealthily as a tiger, and at last his suspicions were confirmed, for Father Madeleine was indeed none other than Jean Valjean, the ex-convict. And now the clutches of the law again fastened themselves about Jean Valjean and he was sent back to the galleys for life.

Some months later these lines appeared in a Toulon newspaper:

Yesterday a convict at work on board the *Orion*, on his return from rescuing a sailor, fell into the sea, and was drowned. This man was registered by the number 9430, and his name was Jean Valjean.

Jean Valjean had indeed disappeared in the sea after his heroic rescue of the sailor, but it was not by accident. He had plunged into the sea in order to regain his freedom, for he now had a purpose which he felt he must carry out.

A poor woman named Fantine had been forced to leave her child with strangers in order to obtain work. When she first came to Jean Valjean's notice the poor mother had suffered all the misery that human strength could bear, and she died before her child could be brought to her. As she lay dying Jean Valjean solemnly determined that he would care for the little girl.

He found that the child Cosette, a frail little waif of eight years, had suffered much from curses and blows, cold and hunger. When Jean Valjean placed in the child's arms her first doll and led her away to a new life, her trusting little heart went out to him, and she felt somewhat as if she were near God. And her trust and love helped Jean Valjean to forget the bitterness bred by his early experiences.

Time passed. Still strong and brave in spite of his advancing years, Jean Valjean again and again faced danger and escaped it. But there remained for him one more great struggle. Cosette was now a young woman and Jean Valjean knew that he must give her up, for she loved a young man named Marius. Yet out of his great and unselfish love for Cosette, he risked his own life to save that of Marius. It was at the time of the revolution of 1832. Marius was wounded in the rioting and Jean Valjean carried his almost lifeless form through a terrible route—under the ground through the labyrinth of sewers which underlies Paris.

When Marius recovered, he and Cosette were happily wedded, and though the parting brought sadness to Jean Valjean, he was reunited with them in his last hours, and found joy in their happiness, a reward for his long sufferings.

"Come closer, both of you," he said, when he lay dying. "I love you dearly. Oh! it is good to die so! To you, Cosette, I bequeath the candle-sticks on the mantel. I do not know whether he who gave them to me is satisfied with me in heaven. I have done what I could. My children, do not weep; I am not going very far, I shall see you from there. Love each other dearly always. There is scarcely anything else in the world but that—to love one another."

HUGUENOTS (*hū'ġē-nŏts*). This name, given in the time of the Reformation to the French Protestants, was probably a corruption of the German word *Eidgenossen*, applied to the Swiss Confederates, with whom the French Protestants had much in common. In their struggles for religious freedom the Huguenots were driven to become a political party, and even a "state within the state," headed by some of the greatest French nobles.

By the middle of the 16th century their numbers and influence had aroused the fears of the Catholic party and the powerful family of Guise. Eight separate religious wars followed, the last of the series ending in 1598. The first war began with an attack by the Duke of Guise and his followers on a congregation of Huguenots assembled for worship in a barn. The peace which concluded the third war was broken by the massacre of St. Bartholomew, the most dreadful of the many crimes that marked this long and distressing era of religious and civil warfare. (*See* Coligny, Gaspard de.)

The Huguenot wars ended in 1598 when Henry IV—himself formerly a Huguenot, but who later conformed to the Catholic church—issued the Edict of Nantes, which gave them political rights, religious freedom, and the possession of certain fortified towns (*see* Henry, Kings of France). Their fortresses were lost with the capture of La Rochelle in 1628 (*see* Richelieu, Cardinal). Although the Edict of Nantes was in other respects confirmed, they were still from time to time harassed and persecuted.

When Louis XIV revoked the Edict of Nantes in 1685 (*see* Louis, Kings of France), all protection of law was withdrawn from the Huguenots. Although they were forbidden to leave France, more than 250,000 of them managed to escape, and carried French arts and manufactures and some of the best qualities of French citizenship to England, Brandenburg, the Netherlands, and the American colonies, especially Massachusetts and South Carolina. France was thereby the poorer, just as had been Spain after the expulsion of the Moors.

HUMILITY

WE SHOULD never be ashamed of humility. In this great world, with all the majesty of Nature 'round about him, the proudest man may well be humble.

A man may boast of his knowledge, but it is as a grain of sand on the seashore compared with what he does not know. A man may boast of his possessions, but it is poverty compared with the wealth that belongs to us all. A man may boast of his talents, but he is helpless when Nature comes to him and says, "Thou shalt not do this." The wisest and richest and cleverest of men have need of great humility.

It will help us all our lives to be humble, to be ready to learn, and not to boast overmuch of the powers that came to us from God, not to bear too proudly the precious gifts we were not responsible for. It will help us to sit at the feet of those who can teach us wisdom; it will never help us to pretend to know the things we do not know.

It will help us to remember always the limit of our powers. We may long and dream, we may press on and achieve; and it is right, in one great sense, that we should never be content, though we need not be forever wanting the impossible. We are wise if we do gladly and well the things that come to our hand, knowing that in this world there is need of many kinds of service, and of well-doing in all. "They also serve who only stand and wait."

It is good to have the strength of a giant, but it is not always good to use it so. It is good to know whatever there is to know, but we need not parade our learning as a jeweler shows his diamonds in a window. There is a great story somewhere of a nobleman's son. There was no wiser man in France, and people came from every part of Europe to meet him. A stranger came on a visit to his father's house one day and stayed to luncheon, and at last the time came for him to go. As he was leaving he thanked his host for the pleasant hours he had spent with him. "Yes, yes," said his host. "But, tell me, you really came, did you not, to see our wonderful son?" And the visitor was compelled to tell the truth, and say how much he would have liked to meet him "You sat by him at lunch," said his host. So modest is true wisdom!

It is humility that has given the world its greatest pride. It is the desire to know that has given us all our knowledge. All the glory that is written in books, all the wonder that is painted in pictures, all the immortal music that seems to lift us up to heaven, has come from men who came humbly into the world, went through life in great humility, and were not too proud to learn to serve that they might command, to seek that they might find, to knock that the door might be opened. He is wise who knows, and remembers, that we have come into this world as suppliants, heirs of the wealth that others have bequeathed to us, possessing nothing of our own, but with the mighty privilege of learning to conquer by learning to obey.

There was a great Frenchman named Pasteur. He was to cover his name with the glory that will shine forever in the history of his land, and he wrote to his father at the beginning of his great work praying that he might be able to add one little stone to the temple of human knowledge! He prayed to add one little stone, but in the end he set up a mighty temple in which the human heart will worship as long as the human mind endures.

And, long before Pasteur, there was a great Englishman named Isaac Newton. No man in England knew more than he. A marvelous work he did, astonishing discoveries he made, and all the world is richer because Sir Isaac Newton lived. Yet this great man, one of the greatest men of his time, or of all time, declared that he felt at the end of his life as if he had been picking up a few pebbles on the seashore while the ocean of truth lay unexplored round about him! He had filled the whole world with wonder and set up a kingdom of knowledge, but he felt at the end of it all like a little child picking up pebbles.

So Pasteur begins, so Newton ends, in deep humility, and we do well to be humble, seeing the wonders that they wrought. We need not be ashamed to keep them company; we need not be too proud to pick up pebbles, and so add some little stone as our share of the building up of the glory that awaits us all.



Here is Mother Ruby-Throat and her two babies in a nest in a pitch pine tree.

HUMMING-BIRD. Like a splendid jewel, the tiny humming-bird flashes across a garden at a speed the human vision is unable to follow. Exquisite in form and brilliant in its changeable coloring, this mite is the masterpiece of the whole bird family, though it is usually less than four inches long. Nature never overdoes, so this tiniest of birds does not sing, but squeaks like a mouse.

Humming-birds belong to the New World exclusively. There are about 500 species, nine-tenths of which belong only to the Amazon and Orinoco valleys in South America. All have long slender bills—sometimes longer than the head, neck, and body together—tiny bodies, brilliant plumage, and marvelously developed wing power.

This extraordinary wing power is the result of the humming-bird's feeding habits. Its food is the minute insects which loiter in the depths of flowers too small to support the weight even of so tiny a creature as the humming-bird. So it has developed very strong wings, which sustain it above the blossom, vibrating so rapidly that they make a humming sound and the eye sees them only as a filmy haze. To enable it to reach far into the deep flower-throats it has developed its long beak and its long tapering double-tubed tongue. This tongue can be instantly extended to an extraordinary length to seize insects in flowers or under the bark of trees. The common idea that the humming-bird lives exclusively on the nectar of flowers is a mistake. With the insects it of course gets some of the nectar, but it is the insects, not the nectar, that the bird is after. Like the bees, the humming-birds are very useful in the cross-fertilization of plants, for bits of pollen cling to their bodies and are carried from flower to flower as the little bird searches for food.

The nest of a humming-bird is a tiny cup-shaped affair, such as a fairy might build, and it is made of quite fairy-like material, plant-down, stuccoed with moss and spider-web. The eggs are pure white and never more than two in number.

A FRIENDLY LITTLE HUMMER



The Humming-birds only do this kind of thing for people in whom they have the greatest confidence. If you are very careful and gentle with them and don't try to hurry matters, they'll sit on your finger just like that!

In that part of North America bounded by the Mississippi and the Atlantic, Florida and Labrador, only one species of humming-bird is found. But during the summer months that one, the "ruby-throat," is everywhere present. The male measures a trifle under 3¼ inches from the end of its bill to the tip of its tail, and the female is nearly four inches long. The upper feathers of the male are the glistening green of an emerald, with changeable amethyst lights over the wings and tail; the under-feathers shade from pearl-gray into the darker upper feathers, and the throat is like a glowing ruby, with all its variations of color. The females are more soberly clad. (For illustration in colors *see* Birds.)

Yet for all his splendor, the little fellow is very friendly with his human neighbors and likes to perch about their gardens, calmly preening his feathers, quite unconscious of the delight afforded by the sight of such a performance. Despite its tininess, the humming-bird is a fierce little fighter and will even rout a hawk or crow that ventures too near its nest.

In the ruby-throat and also some other species, the little buglike babies are fed with food the mother bird has partially digested and which she pumps through her bill into the mouth of the fledgling.

Most of the ruby-throats, from as far north as Alaska, winter in southern Mexico or Central America. After migrating to the southern states, these tiny birds some autumn night launch out across the Gulf of Mexico, straight for their winter home 500 miles distant, and, incredible as it may seem, the trip is made without stop for food or rest.

West of the great plains of the United States, a number of other species of humming-birds are found. Among them, California has the Anna's humming-bird, and one of the western species, the rufous humming-bird, is found as far north as Alaska.

Many of the species found in the tropical districts are even smaller and more remarkably clothed than the ruby-throat, for in addition to the brilliant metallic plumage, they have various feather adornments. Of these the most remarkable are the "double-crested," with its growth of amber-like feathers over each eye, and the "tufted-neck," with a wonderful red crest and long green-spotted tufts of red feathers extending from either shoulder.

The humming-bird family is known as the *Trochilidae*. Scientific name of ruby-throat, *Archilochus colubris*.

The Days of CRÉCY, POITIERS, *and* AGINCOURT

A War that Ravaged Europe for More than a Century—What It was All About—The "Black Death" Pestilence that Stalked on Its Heels—How Joan of Arc Drove Out the English

HUNDRED YEARS' WAR (1337–1453). On the side of a little hill near Crécy in northern France, an English army under King Edward III lay drawn up in three orderly divisions late one August day in 1346. On the plain below, outnumbering the English five to one, was a confused disorderly host of mounted French men-at-arms and hired Genoese crossbowmen on foot, under the French king, Philip VI.

Suddenly the Genoese advanced to the attack. But they were tired with a long day's march, and their crossbow strings were loosened by the wetting received in a terrific thunder-shower. Although they "shot fiercely with their crossbows," they were no match for the more rapid shooting of the English longbowmen, whose shafts "fell so thick that it seemed snow." When the Genoese saw the arrows falling thick among them they cast down their bows and fled. At this King Philip flew into a rage and cried out, "Slay these rascals, for they will trouble us without reason!" Whereupon his men-at-arms dashed in among the Genoese and slew a great number of them.

"And ever still," says the chronicler Froissart, "the Englishmen shot where they saw the thickest press. The sharp arrows pierced the knights and their horses, and many fell, both horse and man. And when they were down they could not rise again, the press was so thick that one overthrew another."

In one place the French managed to reach a band of dismounted English knights commanded by the Black Prince, the 16-year-old son of Edward III. In haste a messenger was dispatched by the knights asking aid, but when their request was made known to the king, where he watched the battle from the tower of a windmill, he inquired: "Is my son dead, or hurt, or felled to earth?" "No, sire," said the messenger, "but he is overmatched and has need of aid." "Then," replied the king, "return to them that sent you, and say to them that they send no more to me, so long as my son is alive; and also say to them that they suffer him this day to win his spurs, for I will that this day's work be his, and the honor thereof."

THE TRIUMPH OF THE LONGBOW AT CRÉCY



This picture, from an old print, shows clearly one of the deciding features of the Battle of Crécy, in which the French, although outnumbering the English five to one, were so woefully defeated. With their powerful longbows the English archers not only outmatched the crossbowmen of the French but overwhelmed each onslaught of the enemy cavalry before they could come to close quarters.

As darkness fell the remnants of the French army were fleeing in confusion, but the English lines remained firm in their position on the hill. Thus the English army won at Crécy the first great land battle in the long Hundred Years' War with France.

The war had started in 1337, and it did not finally close until 1453. The causes of the conflict were to be found in the constant clashes growing out of the English holding of Guienne as a fief from the French crown; in the aid given by the French to the Scots in their wars against the English; and finally in the interference of Philip of France and his vassal, the Count of Flanders, with the profitable wool trade of English merchants with the Flemish cities. In addition there was the claim that Edward III himself was rightfully king of France, because his mother was a sister of the late French king, while Philip VI was only a cousin; but the French assembly had decided that the throne of France could neither be inherited by a woman nor by one who claimed through a woman (miscalled the "Salic law").

The conflict was really a series of wars, truces, and peaces, lasting through the reigns of five English kings, from Edward III to Henry V, and of five French kings, from Philip VI to Charles VII. At the time of the battle of Crécy the English had already

won command of the English Channel by a spectacular naval victory at Sluys; and after Crécy, the town of Calais, the door into France, surrendered to them on Sept. 28, 1347, after a year's siege.

For almost ten years after that the fighting lagged due in part to a great pestilence, called the "Black Death," which swept over Europe, carrying off more than a third of the population (*see* Black Death).

Not until 1355 was the struggle between the two countries renewed. The English now carried the conflict into southern France, instead of confining it to the northern section as before. At Poitiers (1356) the Black Prince with a small army of Englishmen was confronted by an overwhelming French force. In vain the Prince offered to surrender his spoils and his prisoners and to promise not to fight for seven years if he might be allowed a safe retreat. This offer was rejected, so certain did the French feel of victory.

The Longbows Win the Day at Poitiers

The Black Prince arranged his troops on a little plateau protected at the flanks by a hedge and by rough and marshy ground. The brave but inefficient French King John threw away his advantage of superior numbers by ordering his knights, weighted down with their armor, to dismount and advance on foot against the hail of English arrows. "There was a sore fight that day," says the chronicler, "and many a great stroke given and received." One after another the three divisions of the French army were thrown into confusion. King John and his youngest son, refusing to flee, were taken captive by the English. Again the victory was due to the new English weapon —the "longbow," with its "cloth-yard shaft"—and to the trained skill of the English archers.

The horrors of a peasants' revolt and civil strife were now added to the miseries of France. A treaty with England was finally concluded at Bretigny in 1360, by which King John was to pay a large money ransom, and Edward III was to have Guienne, Crécy, and Calais in full sovereignty. In return Edward III renounced all claim to the French crown.

But in 1369 the new king of France, Charles V, physically weak but intellectually strong, found an excuse for breaking the treaty and renewing the war. Aided by the able Breton general, Bertrand du Guesclin, he organized an army of professional soldiers instead of the medieval knights, and by cautious maneuvering brought one place after another into his hands. Only Calais in the north and Bordeaux in the south remained to the English at the time of Charles' death in 1380.

Victory of the English at Agincourt

For nearly a generation the war then languished, due to factional strife for power in both England and France. Soon after the accession of Henry V, the hero king of England, it began again. At Agincourt, near Crécy, a small English force was again confronted in 1415 by a large French army. The French, it seemed, had learned nothing from the disasters of Crécy and Poitiers, or from the exploits of Charles V and Du Guesclin. As in the two former great battles, their forces consisted chiefly of dismounted knights weighted down with heavy armor. And again they were packed close together, in a narrow newly-plowed field between two woods, in which they sank almost to their knees. Shakespeare makes Henry V say, the night before the battle, that he "wished not for a single man more" to share the glory. A third great English victory, equal to those of Crécy and Poitiers, was the result.

By the Treaty of Troyes (1420) the defeated and disunited French agreed that Henry V should marry Princess Katherine, the daughter of Charles VI of France; that during the life of this insane king, Henry should act as regent; and after Charles' death Henry should reign as king of France as well as England.

Henry V did not live to wear the French crown for he died seven weeks before Charles passed away (1422). The death of these two monarchs left the claim to both thrones to Henry VI, the nine-months-old son of Henry V and Queen Katherine.

The English claims in France, however, were disputed by the disinherited dauphin of France, later Charles VII, who refused to accept the Treaty of Troyes. For a time he was too weak to be feared and at the end of seven years it seemed that Orleans, his last considerable stronghold, would surely fall to the English.

The Wonderful Maid of Orleans

Just at this darkest moment in the fortunes of France, a new force appeared in the person of Joan of Arc, the Maid of Orleans (*see* Joan of Arc). Inspired by her patriotism the French forced the English to raise the siege of Orleans. Victory followed victory in rapid succession, until finally Joan led the dauphin through a hostile country to be crowned at Reims as King Charles VII. Even after Joan's capture and execution by the English and Burgundians her spirit seemed to inspire the French and to wake in them a new national sentiment. Little by little they drove the English back. Finally the war ended in 1453 with only Calais remaining in English hands.

Instead of winning the French throne for the English king, the Hundred Years' War had lost for him the last of those continental possessions which had once been held by Henry II. The French king no longer numbered a powerful rival monarch among his vassals, and soon established an almost absolute power in his kingdom. He enjoyed a permanent revenue and was supported by a standing army equipped with modern artillery—for cannon had come into use either at or since the battle of Crécy. In addition the hundred years' conflict to expel the foreigner from their soil had developed in French bosoms the root of that intense patriotism which today characterizes France. But against these gains for France must be balanced fearful losses inflicted upon its land and people, the check to population, and the brutalization of long-continued warfare.

HOW THE MAIDEN WARRIOR ENTERED ORLEANS



At the head of her devoted soldiers, and holding high her white banner, embroidered with lilies and sacred images, Joan of Arc fought her way through the English army which was besieging Orleans and relieved the despairing French garrison within. We see her troops entering the gate over the drawbridge which was let down by those chains, as soon as the enemy had been driven off. That standard of Joan's was looked upon as an omen of victory. In besieging Tournelles, for example, she fell wounded, but passed her banner to a soldier, saying that when it touched the walls, they would surely enter. And so they did.

contained in the Easy Reference Fact-Index at the end of this work

The BROAD HUNGARIAN PLAIN *and Its Picturesque People*



This is one of the little bell towers you will see in the villages all over Hungary.

HUNGARY (*hŭn'gă-ry*). Within half an hour of its capital city, Budapest, lies the heart of the present republic of Hungary—the great *Alföld* ("lowland plain"), the richest agricultural land of Europe, as level as a threshing-floor and of amazing fertility. Through its fertile expanse flow the broad winding Danube and its sluggish tributary the Theiss, fringed with marshes. Cornfields that stretch uninterrupted as far as the eye can reach give way to vaster fields, where peasants in the garments that Asia wore before the Christian era are feeding countless stacks of wheat to modern threshing-machines.

It is a peaceful land of broad meadows, strips of clover, huge windmills moving surely but leisurely, like the Magyar himself; of vineyards, long stretches of bright red peppers from which paprika is made, and purple alfalfa fields; of huge rectangles planted with tobacco, cabbage, potatoes, or sugar-beets. The landscape is everywhere dotted with splotches of red and blue—the full bulging skirts and 'kerchiefs of the peasant tillers of the plain. Stubble-fields, gorgeous with poppies and sunflowers, contrast vividly with occasional patches of fallow land or pasture, where "Little Boy Blue" is tending a flock of snow-white geese. High well-sweeps are always in sight.

Splendid asphalt roads, shaded by long rows of Lombardy poplars, lead off in every direction—past one village after another of whitewashed walls, red-tiled or straw-thatched roofs, church spires, and often the graceful stony finger of a mosque, to remind one of 150 years of Turkish rule over Hungary (1526–1683). The long narrow peasant houses look out on the street over little gardens of old-fashioned flowers, walled in with whitewashed sun-dried brick.

Farm Life a Fine Art among the Magyars

In his home the "Magyar" (as the true Hungarian calls himself) has reached a high stage of peasant culture. When he can afford a floor of wood he has it, even in the kitchen; when he must put up with an earthen floor, it is compact, hard, and wonderfully clean. In his kitchen, as clean and orderly as his front room, his wife cooks in a pot which hangs from a crane over an open fireplace, or on an earthen or tile stove with a tiled chimney. His passion for china and earthenware, dishes and bowls, and the pitchers and mugs with which he loves to line one or more of the walls of his house, is only exceeded by his love of flowers. He refuses to live without flowers and fruits and trees.

The Magyar's conception of a completely furnished house goes beyond mere furniture in sufficient quantity. His furniture must be decorated, his chairs and benches painted, his great chests carved. The walls are tinted, as are the great beams and boards of the ceiling. He even decorates his veranda, and always the gable ends of the house, with tasteful designs in carving or bright paints. The outside walls of the house are always white and clean. His pigpens, corn cribs, stables, and barns are substantial and often decorated in colors. The yard about the house is clean and orderly, either graveled or covered with compact turf. His fields are not disfigured with either fences or weeds.

Vast estates belonging to the church and nobility until recently occupied a large part of the Alföld; 77 per cent of the peasants owned no land at all. With the change of government after the World War of 1914-18 most of the estates were broken up into small holdings.

The Hungarian Steppes and the Cowboys

Between the Alföld and the vineyard-clad foothills lies the *puzta*, or steppes of Hungary, which resembles the Alföld as it was before the days of agriculture. Treeless save for small clumps of locusts near the widely separated peasant homes, it is the range-land of thousands of big-boned long-horned Hungarian cattle and flocks of sheep, patiently tended by tall fellows in sheepskin greatcoats and cowhide sandals, who lean on their crooks and seem always intent on some far-away world, while they puff lazily at their long pipes. Here, too, are seen many camps of the Tziganes (*tsĭg'ă-nĭz*) or gipsies. About their queer brown tents naked dark-skinned children roll in the grass; and the men, with gaudy spangled waistcoats, flapping trousers, and broad-brimmed hats stroll lazily about or idly pick the many-hued flowers while the gaily bedecked women tend the fat wild turkey or young pig that hangs roasting over the fire.

The Magyar is a little shorter in stature than the average American, strong and healthy. His appreciation of the beautiful, so evident in his architecture, his innate orderliness and cleanliness, his passion for flowers and music, is second only to his love of his land and his absolute independence of spirit and self-confidence. He is generous to a fault and extravagant, but hard-working. He does not like trade, which has fallen almost entirely into the hands of the Jews. The Magyar tongue is closely related to that of the Finns, Lapps, and Ostiaks of Asia, and bears little relation to the other languages of Europe except the Turkish. Although our alphabet is used, no word on a Magyar printed page gives us any hint as to its meaning, since the language has practically no

Latin or Teutonic roots. This makes the very extensive literature written in the Hungarian language a sealed book to most Europeans and Americans.

The Great and Beautiful City of Budapest

Budapest, the seat of government, with a population well over three-quarters of a million, is beautifully situated on both sides of the Danube (*see* Budapest). Other important cities are Szegedin and Theresiopel. A very complete system of state-owned railroads connect the principal cities with one another and with the outside world. The

A TYPICAL HUNGARIAN FARM HOUSE



We are looking through the arched openings of the porch of a Magyar house of the better sort. How white and clean the walls look, and how neat the yard! The pigpens, corn cribs, stables, and walls are all of the same substantial build.

Danube River also affords a great avenue for commerce. Before the World War Hungary had a great export trade in flour, wheat, corn, barley, cattle, beef, pigs, horses, and wine in barrels. Manufactured goods in cottons, woolens, silks, and leather were the principal imports, coming largely from Austria.

The new Hungary (or Magyaria)—extending from the River Drave on the south to the Danube on the north, and from the neighborhood of Pressburg on the west to the mountains inclosing Transylvania—with its 36,500 square miles, is less than one-third the area of the old kingdom as it was under Hapsburg rule.

The Magyars, a Finno-Ugric race, first came as nomadic raiders from Asia, up the valley of the Danube, as early as the 9th century. After their defeat by the Germans at the Lechfeld (in Bavaria) in 955, they settled down as permanent residents—an island of Asia in the heart of the Slavic east of Europe—in the broad valley of the Theiss. In the year 1000 their king, known in history as St. Stephen, accepted Christianity and a crown from the Pope. In the 15th century John Hunyady, the great national hero of Hungary, defended the land as regent against the oncoming floods of Turkish conquest, until his death by plague a few days after his successful relief of Belgrade from Turkish siege (1456). On the fatal field of Mohács (Aug. 29, 1526) the last of the Angevin line of Hungary's kings perished, with 20,000 of his men, and the horsetail standards of Sultan Solyman the Magnificent were soon spread over almost the whole of the land. Over the small remnant of non-Turkish Hungary, the Hapsburg Ferdinand of Austria (brother of Emperor Charles V) was chosen to rule. It was not until 1718 that his successors completed the redemption of Hungary from Turkish rule.

Origin of the Dual Monarchy

Restiveness under the sway of the Austrian Hapsburgs led Hungary in the course of the ill-fated Revolution of 1848 to establish a short-lived republic, with Louis Kossuth as president. When this was put down, Austria was obliged (1867) to grant Hungary equal partnership in what was thenceforth known as the "Dual Monarchy" of Austria-Hungary.

The World War resulted in a greatly reduced Hungary, but gave it complete independence. It largely did away also with Hungary's "nationalities problem" by lopping off the Slovak strip along the Carpathians for Czecho-Slovakia, giving Transylvania to Rumania, and Slavonian-Slovene-Croatian territory on the west to Jugo-Slavia. Now the Mag-

yars of the greater and lesser Alfölds, where the population has always been almost wholly Magyar, have a chance to show the world what is in them, and to correct the reputation given them by the noble and official class, as proud and harsh rulers of subject peoples. The monarchical form of government is preserved, though opposition of the powers prevents a return of the Hapsburgs to the throne. Population, about 7,850,000.

Huns. A writer of the early Middle Ages gives us a picture of this savage wandering race of that time. "Nations whom they could never have defeated in fair fight," he says, "fled in horror from those frightful faces, if indeed I may call them faces; for they were nothing but shapeless black pieces of flesh, with little points instead of eyes. They have no hair on their cheeks or chins. Instead, the skin of their faces show deep furrowed scars; for hot irons are applied to the face of every boy that is born among them, so that blood is drawn from his cheeks before he is allowed to taste his mother's milk. The men are little in size, but quick and active in their motions; and they are especially skilled in riding. They live largely on half-raw animal flesh, which they merely warm by placing it between their own thighs and the backs of their horses. On horseback every man of that nation lives day and night. On horseback he takes his meat and drink, and when night comes he leans forward on the neck of his horse and there falls asleep." This lively account by a hostile writer might not have been accepted as history had not the Huns so often lived up to the bad reputation he gave them.

In 374 A.D. the Huns crossed the Volga River and entered Europe for the first time from their homes in Central Asia. They conquered the Ostrogoths, and driving the Visigoths across the Danube occupied the region north and west of the Black Sea. There they lived for more than 70 years, before they began their second and greater wave of invasion. In 451, under Attila, the "Scourge of God," they swept into Germany and crossed the Rhine into what is now France, laying waste the country with fire and sword. In a bloody battle near Chalons he was defeated by a combined army of Romans and Visigoths under Aëtius and forced to retreat. The next year the Huns descended into Italy, devastating the country. They would probably have taken Rome, as Alaric had done 40 years before, had it not been for the bravery of Pope Leo I, who in an interview so overawed the fiery Hun that he spared the city and withdrew from Italy. With the death of Attila in 453 the empire of the Huns, which included all the peoples from the Volga to the River Rhine, quickly fell to pieces. The remnants of Attila's following either went back to Asia or mingled with the peoples they had subdued. Their great leader lived on in German legend as Etzel in the 'Nibelungenlied'. The Magyars, who several centuries later settled what is now Hungary, were related to the Huns.

DO YOU WONDER PEOPLE FLED IN HORROR?



"Nations fled in horror from those frightful faces, if indeed I may call them faces; for they were nothing but shapeless black pieces of flesh with little points instead of eyes." Such were the Huns, as the medieval chronicler depicts them, and the hair of those fierce mustaches was all the hair that was allowed to grow on their faces, for, says this quaint old writer, hot irons applied to the faces of the baby boys burned out the hair on cheek and chin before ever they were allowed to taste their mother's milk.

Huron, Lake. The second largest of the Great Lakes, Huron, is about 250 miles long and its average width is about 150 miles. With Georgian Bay its area is 23,200 square miles. So irregular is its shape that a line drawn from the head of Saginaw Bay to the far shore of Georgian Bay is nearly as long as the lake itself. Its level and its depth are about the same as those of Lake Michigan, with which it connects through the Straits of Mackinac, its surface being 581 feet above and its bottom 121 feet below sea-level. Its greatest depth is 702 feet. In spite of the mountainous billows that the northeasters drive upon its western shore and which make Saginaw Bay the dread of mariners at the end of the season, Lake Huron is a great highway of traffic. Its own ports are of secondary importance, however.

For any subject not found in its alphabetical place see information

The most beautiful scenery of all the Great Lakes is in Georgian Bay, a great arm of Huron, 120 miles long and 50 miles wide, separated from it to the north and east by the long island of Manitoulin. A trip through the North Channel, between Manitoulin and the rocky bluffs of the Ontario mainland, and on among the "Thirty Thousand Islands" that strew the northern half of the bay is one of the most picturesque water voyages in North America. Georgian Bay is becoming one of the most popular vacation spots of the continent, and hundreds of cottages and hotels have been built on its islands within the last few years.

A ship canal is planned to connect Georgian Bay with the St. Lawrence at Montreal, a distance of 440 miles. It is to start at the northeastern corner of the bay, follow French River to Lake Nipissing, then pass by way of a number of small lakes to the Ottawa River, and so to Montreal.

Through the St. Clair River, Lake St. Clair, and the Detroit River, the waters of Lake Huron flow into Lake Erie. The passage between these lakes has been dredged and deepened and about a mile of canal has been constructed. (*See* Great Lakes.)

JOHN HUSS



"I am prepared to die," he said, "in the truth of the gospel which I taught."

Huss, John (about 1369–1415). "I am prepared to die in the truth of the Gospel which I taught and wrote." Like Wyclif of England a generation before, and like Martin Luther of Germany who was to lead the great Protestant Reformation a century later, John Huss, the Bohemian religious reformer, defied the authority of the Church and was ready to defend his principles to the uttermost. In his case the uttermost was demanded, and for his views he was burned at the stake as a heretic.

Huss was born of humble parents in the little Bohemian village of Husineç. He was christened Jan or John, and from his birthplace was called John of Husineç, or, in shortened form, John Huss. Having decided to become a priest he entered the University of Prague and after his graduation became a lecturer there on philosophy. For a time he was a rector of the university. He also took a prominent part in the nationalist Bohemian protest against the undue influence of Germans in the university, which in 1409 led the German masters and scholars to secede and found the rival University of Leipzig.

As a preacher Huss won the hearts of the people by his powerful sermons in the Czech (Bohemian) tongue, as well as by the purity and nobility of his life. His attacks on evil living among the clergy, although in this he was supported by the archbishop of Prague, won him much enmity.

Huss had early come under the influence of the religious and philosophical writings of John Wyclif, which had gained a strong hold in Bohemia. These were written in Latin, which was then the universal language of scholars, and so were as easily read by one land as another. Huss adopted many of the philosophical and religious teachings of Wyclif; he did not follow him, however, in the rejection of the doctrine of transubstantiation, but held to the orthodox belief. Nevertheless when Huss opposed the burning of Wyclif's books, he was charged with heresy and forbidden to preach or to teach.

The struggle was complicated by the fact that this was the time of the Great Schism in the Church, when there were three rival claimants to be pope. The climax came when Huss attacked the granting of indulgences in Bohemia by one of the three claimants for aid against his enemies, and the pope's bull was burned by his followers amid much disorder. Huss was now excommunicated, and for two years went into retirement. He used the interval for writing defenses of his views, and incidentally he became one of the founders of the Bohemian tongue as a literary language.

When the Council of Constance met in 1415 to heal the Great Schism and consider the question of reforms in the Church, Huss attended it under a safe-conduct from the Emperor Sigismund to justify his views. On his arrival he was arrested as an excommunicated heretic and thrown into prison. His condemnation was a foregone conclusion. When he steadfastly refused to recant his teachings, unless shown that they were in conflict with the Scriptures, he was condemned to death. As the sentence was passed he gazed steadfastly at Sigismund, who had the grace to blush with shame at the thought of his violated safe-conduct.

Huss met his death (July 6, 1415) with heroic constancy, as also did his disciple Jerome of Prague, a year later. "Thinking to extinguish heresy," says an English historian, "the Council of Constance had made it the national faith of Bohemia, and had made the martyr Huss the national hero and the national saint." The immediate result was the terrible Hussite War, a struggle on the part of the Bohemians for national, religious, and social revolution, in which they resisted the combined force of Europe in numerous "crusades" and for nearly a score of years prevented Sigismund from securing his inheritance of the Bohemian crown.

Huxley, Thomas Henry (1825–1895). Rugged honesty, blithe courage, and unaffected humanness were the outstanding qualities of this great biologist who for more than 40 years was the foremost British champion of the new scientific doctrine of evolution. Educated as a physician, Huxley on graduation obtained an appointment as surgeon in the British navy. Among the many valuable studies of sea creatures that he made during a voyage to Torres Straits (1846–1847) was one 'On the Anatomy and Affinities of the Family of Medusae', which was to

furnish a most important link in the theory of evolution. This was before the publication of Darwin's 'Origin of Species', but Huxley here gave the first hint of the now accepted principle that the growth of a highly developed creature from embryo to adult is a hurried retelling of the story of the evolution of that species.

Darwin said that Huxley was one of the three men in England whom he needed to convince of the theory of evolution in order to satisfy himself. So thorough and earnest a convert did Huxley become that his popular lectures and writings in defense of Darwin's theory have somewhat obscured his own original work in biology and zoölogy.

From 1854 to 1885 he was professor of natural history in the Royal School of Mines, London, being the first great teacher of biology by the laboratory method. Toward the end of his life he gave much time to public work in general education, to improving legislation concerning the fisheries, and the like, for he believed, in his own words, that he was "a man and a citizen before he was a philosopher."

Among Huxley's best-known writings are: 'Evidences as to Man's Place in Nature' (1863); 'Lay Sermons, Essays, and Reviews' (1872); 'The Crayfish: An Introduction to the Study of Zoölogy' (1880); 'Scientific Memoirs' (4 vols., 1898–1902).

HWANG RIVER. Winding through the mountains and over the fertile plains of northern China flows the great and terrible Hwang Ho ("Yellow River"), the "Sorrow of China." In its keeping are the lives and the fortunes of millions of people, and like a capricious giant it deals out death or wealth by turns. For thousands of years, since the earliest dawn of Chinese history, the people have struggled with this giant, trying to curb his strength, and today they are no nearer conquering it than ever.

Through the first two-thirds of its course the river, which is the second in size in China, flows through mountains, falling rapidly. The soil of these mountains is a yellow earth which dissolves easily and is washed down in enormous quantities by the river, staining its waters the deep yellow from which it, and the Yellow Sea, get their names. But as the river leaves the mountains and starts across the flat plains it begins to deposit this sediment. By degrees the bed rises and the people build embankments to prevent the river from overflowing. As the bed rises the embankments must be raised too, until the stream is flowing many feet above the level of the surrounding country. As time goes on the situation becomes more and more dangerous; finally a breach occurs and the whole river pours over the country, carrying destruction and ruin with it. If the breach cannot be repaired the river leaves its old channel entirely, and finds a new exit to the sea along the line of least resistance. Many times it has thus changed its course, entering the sea through different mouths as much as 500 miles apart.

In 1851 the river made such a change, and since then it has flowed to the north instead of to the south of the rocky peninsula of Shantung. It took 15 years to repair the damage, and even then many changes remained. The southern valley from a well-watered fertile plain was left practically without water. The northern valley was also injured because the river deposited three feet of sand and mud over the fields. Later the northern valley gained greatly in fertility because of the new water supply. In 1887 another flood occurred which swept away whole villages, killing more than a million people and flooding 50,000 square miles of territory.

The Hwang Ho rises in the mountains of Tibet, not far from the headwaters of the Yangtse Kiang. It makes first a great sweep to northward, and then, having struck a high mountain range, turns due south for 500 miles. It then turns eastward towards the sea. Although it is the second river in China, it is too shallow in winter, and too swift in summer, to be navigable. Its total length is about 2,700 miles.

HYACINTH. The ancient Greeks told this story of the origin of the beautiful and fragrant hyacinth. One day, said they, the god Apollo was playing a game of quoits with a young mortal, Hyacinthus, whom he dearly loved, when Zephyrus, the god of the west wind, passed by. Being jealous of Apollo the west wind blew the latter's quoit aside, and caused it to strike poor Hyacinthus, inflicting a mortal wound. In a few moments Hyacinthus died in Apollo's arms. In his memory the grieving Apollo then caused these beautiful clustered blossoms to spring from the fallen drops of the youth's blood.

A HYACINTH IN BLOOM



Once an insignificant wild flower, the garden hyacinth has been civilized and turned into a beautiful plant with rich, sweet-scented blossoms.

At all events we know that the wild hyacinth was originally found in Greece and Asia Minor. It was by comparison an insignificant plant. Brought to western Europe in the 16th century, the hyacinth was extensively cultivated by Dutch horticulturists. They succeeded so well that the original blue and purple blossoms were varied to numerous shades of pink, rose, yellow, scarlet, and pure white, so that today we have a splendid selection from which to choose. The best bulbs are still grown in Holland, where gardening is a national industry.

The hyacinth proper belongs to the lily family. The water hyacinth (*Eichornia speciosa*), which occurs in American tropical and sub-tropical regions, is a

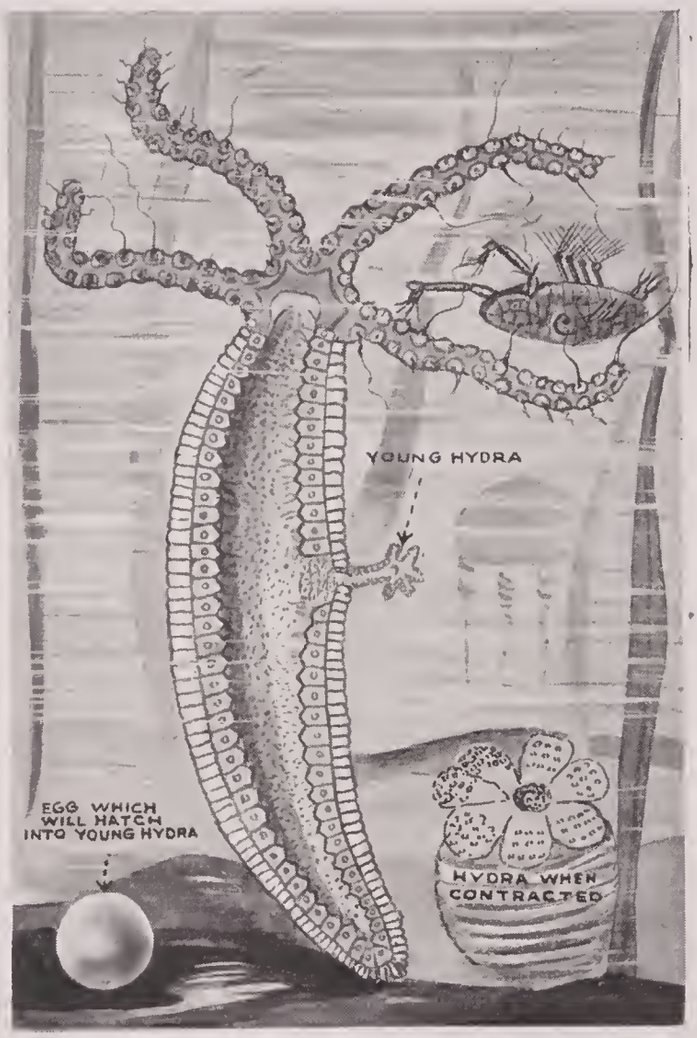
member of a different family, *Pontederiaceae*. It grows in such profusion and spreads so rapidly that many rivers in the southern part of the United States are choked with the plants and water traffic seriously impeded. Various methods have been tried of eradicating it. Army engineers send out boats to cut out the jam of hyacinths as soon as it forms and the tangled mass is pushed into the current to be carried away. Experiments are being made with a parasite which attacks the leaves from beneath and in time kills them. Although it is almost without food value, cattle seem very fond of it and have been in some instances lured to death in efforts to obtain it.

Scientific name of garden hyacinth, *Hyacinthus orientalis*. Flowers small, bell-shaped tubes with 6 recurved segments; borne in a crowded raceme on a stout scape; stamens 6 in number. Leaves narrow, erect from the base and 8 to 12 inches long. Bulb produces long fibrous roots.

HYDERABAD'. In the center of the peninsula of India, between the provinces of Bombay and Madras, lies Hyderabad, the largest and most important of the states, with an area of 82,698 square miles, and a population of about 14,000,000. Its ruler is the "Nizam," whose wealth and power surpass that of all the other princes of the Indian Empire. In the 17th century Hyderabad was a province of the Mogul Empire whose capital was at Delhi; but with the decline of that power in the 18th century the Nizam became independent. The ruler and the government officials are still Mohammedans, although the people are chiefly Hindus. In the great Indian Mutiny of 1857 the Nizam remained loyal to the British, and his successor was one of the most active Indian princes on the Allies' side in the World War.

Hyderabad is a plateau about 1,200 feet above sea-level. It is rich agriculturally and has great mineral wealth, especially coal. Irrigation, railroads, and manufactures have brought great prosperity to its rulers. The products include millet, rice, wheat, oil-seeds, cotton, tobacco, sugar cane, wild silk (*tussur*), lac, gums, and oils.

THE HYDRA CAPTURES A MEAL



This picture shows a hydra very much enlarged and cut in two from top to bottom so you can see how it is made inside. Two of its tentacles are engaged in capturing a crustacean. Despite its relatively large size, the crustacean cannot even resist, for those tiny threadlike darts which the hydra shoots out bear a paralyzing poison.

But of greater interest to visitors are the relics of India's historic past which abound in this region. Chief among these are the marvelous temples at Ellora and at Ajanta in the northwestern corner of the Nizam's dominions. Most of these consist of caves carved out of the rock and decorated with weirdly beautiful designs and figures made at the cost of enormous labor. The Kailas at Ellora is looked upon as one of the wonders of the world, for not only was its interior hewn out into great chambers and altars and bas-reliefs, but the outside of the rock-bound hill which formed its roof was chipped off bit by bit and fashioned delicately into an exterior of graceful and intricate design. As it stands today, the temple looks as if it had been built up stone by stone, until a closer inspection shows that its walls and colonnades, its obelisks and the thousands of mythological figures grouped about it are all part of one great carved rock.

The city of Hyderabad, capital of the Nizam's state, is the fourth largest city in India (population, about 500,000). In the Sind region of northwestern India is a city likewise called Hyderabad, but it is of lesser importance.

HYDRA. Gather in a bottle some of the floating green weeds or submerged plants or stones from a stagnant pond and empty them into a glass bowl filled with clean pond water. You may then find attached to the plants the tiny fresh-water creatures we call "hydra." But you must become a scientist for five minutes, in order to enjoy and appreciate these small, lowly, and inconspicuous but very interesting members of the animal kingdom.

Hydra a monster? Yes, to the many small animals it preys on; and it does resemble the many-headed Hydra monster of Greek mythology (*see* Hercules) for which it was named. Picture it thus: about the size and shape of the pointed half of a common pin; the larger end sticky, to attach it to any objects in the quiet fresh water of ponds and streams where it lives; in the free end the mouth, capable of opening wide, and

surrounded by a circle of about six or eight threadlike tentacles. Imagine the pin a tiny chimney made of two layers of bricks on end, these being the two simple layers of cells in the hydra's body-wall. The cavity inside is the stomach, almost its only organ—no sense organs, no skeleton, and no nervous, breathing, blood, or other systems.

You see hydra was about Nature's first experiment in building animals out of different kinds of cells (*see* Cell). But, once discovered, its plan was used for all of the great branch of animals to which the hydra belongs—thousands of kinds of polyps, sea anemones, and jelly-fishes. Some of its relatives, moreover, branched out, as it were, and evolved into the higher animals, with their many organs and systems for various uses.

Hydra forms daughters mostly from buds on its sides; but in the fall it produces eggs, which hatch out the next spring. When a hydra is injured, lost parts are quickly restored or "regenerated," as the scientist says. If cut into a dozen pieces, each piece will soon form a complete hydra. Curious stinging cells armed with poison are located in the tentacles, which paralyze the small animals that swim against them, enabling the hydra to swallow them.

The few species of hydra, mostly world-wide but seldom abundant, are almost the only fresh-water representatives of their great branch of the animal kingdom (the *Coelenterata*). That is one reason why the biologist prizes them so highly. The name hydra comes from the Greek *hydor*, meaning "water." Two of the more common species of hydra are the brownish *Hydra oligactis*, and the green *Hydra viridissima*.

HYDRANGEA. "Won't you walk into my flowers?" says the hydrangea to the pollen-bearing insects, flaunting her showy outer cluster of sterile flowers which have neither stamens nor pistils and serve only to attract her six-footed visitors in the direction of the small bashful fertile flowers inside.

THE BEAUTIFUL HYDRANGEA



Those big gorgeous blossoms conceal the true flowers inside them. They are the show-windows, so to speak, which attract the insect shoppers.

The hydrangea plays a conspicuous part in the flower pageant of our late summer and autumn gardens. It is a large ornamental shrub with a big globular head of flowers, usually pink, but sometimes bluish or white. There are more than 25 kinds of these hardy shrubs, found chiefly in North and South America, China, Japan, and in the mountains of India. Perhaps the kinds we know the best are those grown as showy borders for our gardens, sometimes eight to ten feet high. We are familiar, too, with the dwarf variety grown in pots that we see particularly at Easter. This variety can be grown out of doors, but it must be stored during the winter.

The hydrangea's name comes from the Greek *hydor*, "water," and *angeion*, "pail." It belongs to the *Saxifrage* family. The large oval strongly veined leaves grow in opposite pairs along the stem. Scientific name of common dwarf variety, *Hydrangea hortensia otaska*.

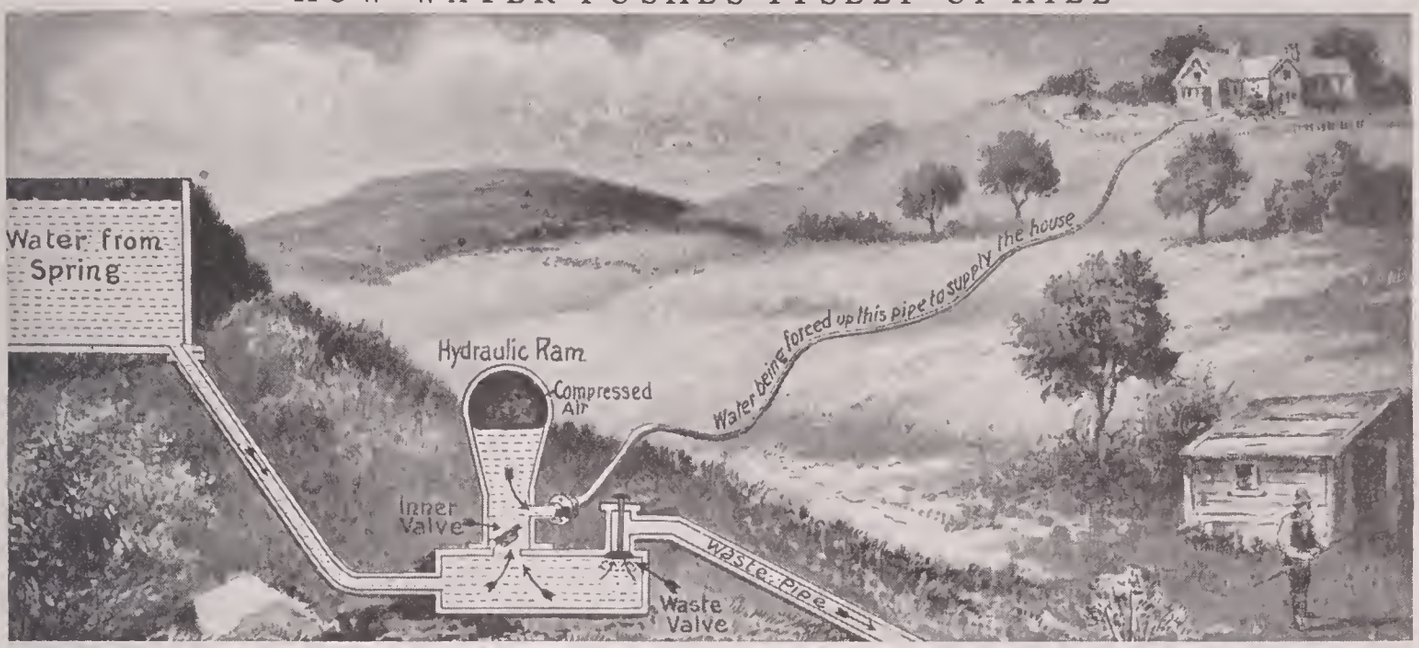
HYDRAULIC MACHINERY. Click-*chug!* Click-*chug!* Click-*chug!* In the green stillness of the wilderness the staccato beat of unseen machinery, quivering the leaves to its rhythm, is a strangely foreign sound. Presently we come upon the source—a little hydraulic ram less than two feet high industriously pumping water to some unseen cottage on the heights above.

Let us see how it works. From a spring basin some 12 feet above the ram, an iron supply pipe brings the water to the ram at our feet. At first the water flows out through a waste valve and is carried off; but presently the increasing force of the water pushing up against the valve closes it, and it clicks shut. The column of water is instantly arrested, just as when we close a faucet. The recoil hurls the water against an inner valve, opens it, and as the water rushes in, the air in the rounded chamber above is compressed. With the recoil of the water the pressure on the waste valve is lessened, the valve drops open, again providing an outlet for the water, which now turns in that direction. The compressed air cushion in the air chamber expands, closing the valve to the supply pipe, and forcing the water through a delivery pipe high to the house on the hill. The waste valve is again closed by the rush of water, and the hammer-like blow comes again at the air-chamber valve. As the process is repeated, over and over, the water is pumped steadily to a height much greater than its source, with no other force than the energy developed by the fall of the water itself. With a plentiful flow of water and a fall of from 1½ to 10 feet, a water supply can be lifted as much as 250 feet by means of the ram mechanism.

The recoil of the water can also be made to drive the sliding piston of a pump attached to the body of the ram, the piston lifting and pumping water through ordinary pump valves. With this arrangement a ram working with muddy water may be used to raise clear spring water.

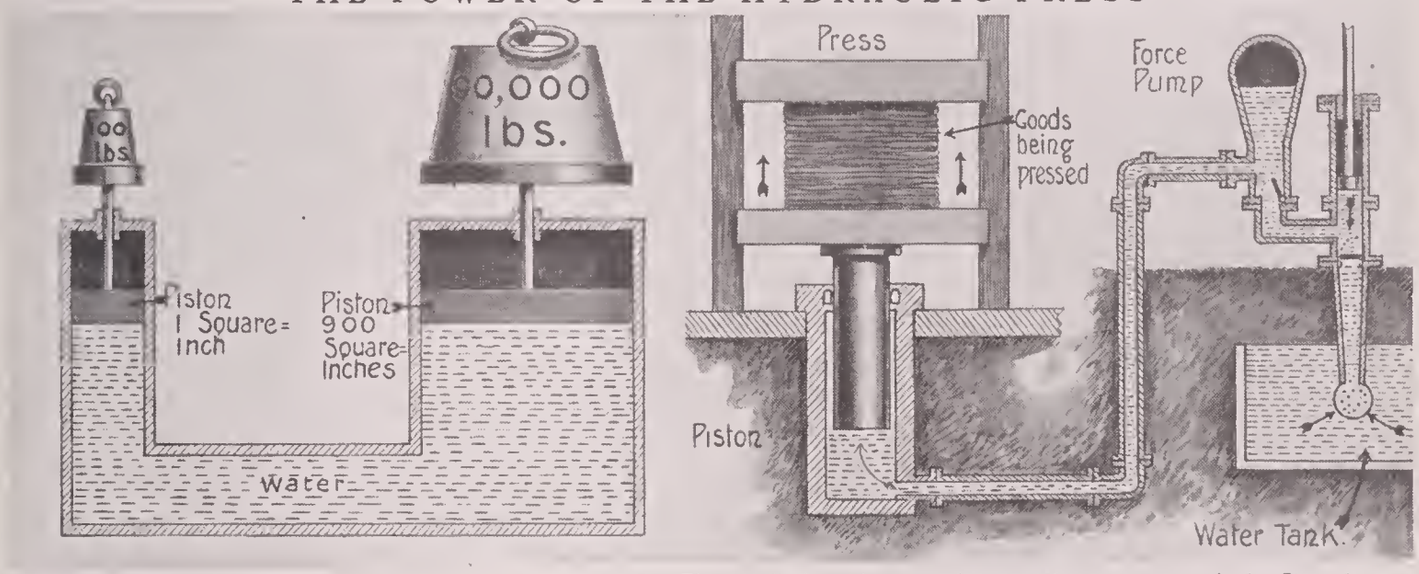
The hydraulic ram is only one of many machines operated with water power. These machines are possible because liquids are, for all practical pur-

HOW WATER PUSHES ITSELF UP HILL



Here you see how a hydraulic ram forces water to "run up hill." From the spring reservoir, the current first passes down through the lower part of the ram and out the waste pipe, until it gains sufficient speed to close the waste valve. This checks its course suddenly, and its momentum carries it up through the inner valve, greatly compressing the air in the air chamber. Once the water loses its momentum, the compressed air forces it back, but this closes the inner valve, and so the water has to go up the supply pipe. At the same time, the rush of pressure being removed, the waste valve opens again, and the whole process repeats itself over and over.

THE POWER OF THE HYDRAULIC PRESS



Here we see how a hydraulic press gets its enormous power. The small piston has a surface equal to one square inch. It pushes on the water, therefore, with a pressure of 100 pounds to the square inch. When this pressure is carried over to the larger piston, with a surface of 900 square inches, you naturally get a total pressure there of 90,000 pounds. The picture at the right shows how this principle is used in an actual press.



Sometimes when firemen are fighting a blaze, a careless truck driver will do a thing like this. The result is, you see, that the flow of the water being stopped while the pressure continues, the hose bursts at its weakest point.

contained in the Easy Reference Fact-Index at the end of this work

poses, not compressible, and pressure exerted on any part of liquid in a closed vessel will be transmitted equally to all parts of the liquid. This principle was discovered by Pascal, the great French thinker who lived in the 17th century.

One of these machines, the hydraulic press, is so powerful that a man, working an ordinary pump handle, can lift hundreds of tons of weight with it. It seems that this would be possible only with very complicated machinery, but as a matter of fact the hydraulic press is very simply constructed. We have a tank containing two pistons, one much smaller than the other. If the smaller piston is one inch square, and the other 30 inches square, and we exert a pressure on the smaller piston of 100 pounds the larger piston will hold up a weight of 100 pounds to each square inch of its surface—30 x 30 x 100, or 90,000 pounds. If the small piston is a pump that lets in more water with each upstroke, the large piston is slowly but surely raised, exerting its enormous pressure.

Uses of the Hydraulic Press

Before more rapid machinery was invented the hydraulic press was in general use for pressing cotton, paper, or hay into bales, for squeezing oil from cotton seeds, and for punching holes in steel plates. Lead and tin pipes are sometimes made with the hydraulic press. These metals become plastic under tremendous pressure and flow out of the prepared orifices in the same way that macaroni is forced from the machine in which it is made by moderate pressure on the dough.

In hydraulic engines water under pressure pushes back the piston head until a sliding valve is opened by which it flows out. These engines are slow, and have been largely replaced by electric motors, although they are still occasionally used for hydraulic drive elevators or for pumping air for pipe organs. Turbines and water wheels are other forms of powerful machinery operated by water power, and used for many purposes (*see* Turbine).

"Hydraulics" (from the Greek *hydor*, "water" and *aulos*, "pipe") is the name which we give to the science which treats of the flow of water or other liquids in motion. It is partly theoretical, based on the general laws of fluid motions as developed in physics, but largely experimental. It has to do with the flow of water through pipes and canals and over weirs and dams, and with the use of rivers and streams for power purposes. The designing of canals, aqueducts, and pipe lines for drainage and public water-works is an important application of the science of hydraulics.

HYDROCHLORIC ACID. An important colorless compound of hydrogen and chlorine used largely in manufactures, generally under the name of "muriatic acid." A usual method of preparing hydrochloric acid is by treating common salt with strong sulphuric acid. The pure compound is a gas which is markedly different in properties from the solution in water. The gas is non-acidic and conducts electricity poorly, while the solution is markedly acidic and conducts electricity well. The acid unites with most metals and metallic oxides to form salts known as chlorides. (*See* Chlorine.)

HYDROGEN. When a cold flask is heated over a gas flame, beads of water gather on its base as if it were sweating. Is it leaking? No; the flame itself is manufacturing water, for the gas contains the element hydrogen, which forms water (H_2O) when it burns or unites with oxygen. Hence comes its name, which is from the Greek words meaning "water-former."

One of the most interesting of the whole group of chemical elements is this colorless, tasteless, odorless gas, hydrogen. We meet its compounds everywhere —in animal and vegetable tissues and products, particularly the carbohydrates (sugars, starches, fats, and celluloses) and hydrocarbons (natural gas, petroleum, and coal-tar products), and in the universal and indispensable form of water. It is also found in all acids, of which it is the essential and characteristic constituent. Yet it is very seldom found uncombined.

Hydrogen, however, is not active; at ordinary temperatures it is lazy or chemically inert toward most other elements. You can shut free hydrogen up with free oxygen at an ordinary temperature, and at the end of years you will find that they have made no perceptible progress toward becoming water. A spark is needed to effect the marriage. When hydrogen burns it produces a very high temperature. In the oxy-hydrogen blowpipe streams of hydrogen and oxygen in the proportion to form water are forced under pressure from separate containers through a jet, igniting as they issue. The resulting flame produces a temperature of about 5,000° F.

Wherever free hydrogen exists, it tends to escape into the upper atmosphere, for hydrogen is the lightest element known—14½ times lighter than atmospheric air. That is why it is the usual filler for the gas-bags of balloons. Its inflammability, however, is a serious drawback, and aeronauts are glad to welcome another element which, though a little heavier than hydrogen, is non-inflammable (*see* Helium).

Another odd thing about this remarkable gas hydrogen is that its chemical actions in many ways resemble those of metals. The more active metals displace it from water and dilute acids. From some of the compounds of metals with oxygen and chlorine it will in turn displace the metals. For commercial purposes hydrogen is obtained chiefly as a by-product in the manufacture of caustic soda (sodium hydroxide). The hydrogen released by the electrolysis of a solution of salt in water is collected and compressed in steel cylinders. It may also be obtained by liquefying water gas, which is a mixture of hydrogen and carbon monoxide. The hydrogen evaporates more readily than the carbon monoxide and therefore is readily separated.

The chemical symbol of hydrogen is H. Its atomic weight is 1 (or 1.008 according to the more recent international table of atomic weights). It has been liquefied and solidified.

HYDROMETER. With this simple instrument for determining the specific gravity or density of liquids, you can tell whether milk has been watered, the strength of the acid solution in a storage battery, etc. It is a slender sealed glass tube weighted at the lower end so that the instrument will float upright. The level at which it floats in water is marked, and the rest of the tube is scaled like a thermometer. The heavier the fluid in which you place the hydrometer, the higher it floats. So if it sinks less than it should when placed in milk you know that the milk has been watered or that the lighter cream has been removed.

HYENA (*hī-ē′nȧ*). This unpleasant animal, about the size of a large dog, is noted for its cowardice and the unearthly shrieks, like the laughter of a maniac, which it utters when excited. It lives in caves and ruins in central Europe, southern Asia, and Africa, and comes out at night to feed on carrion and start its unearthly howling. The hyena performs a valuable service to the health of the communities which it infests by devouring dead animals and thus acting as a scavenger. So cowardly that it rarely attempts to defend itself, it does not dare to attack an animal that is standing still; but it often so terrifies horses and cattle that they run till they fall from exhaustion. Then the hyena tears its victim to pieces. It was formerly much dreaded in South Africa, where it often entered Kaffir dwellings at night and carried off children sleeping by their mothers.

These carnivorous mammals are related in structure to the cats and the civets. They are ungainly creatures with large heads, and their fore legs are longer than the hind legs, which gives them an awkward, shambling gait. Their powerful teeth and jaws are capable of crushing the hardest bones. There are three varieties of the hyena: the striped, the spotted, and the brown. Probably no other animal has such a reputation for downright meanness and it is therefore a striking fact that even the hyena has the capacity for disinterested affection in his disposition. Herr Schilling, a distinguished German naturalist, who brought two hyenas home with him from Africa, found that they would leave their food—even a beef-bone, which a hyena loves above all things — and trot over to him to be petted! We might also enter on the credit side of the case against the hyena the fact that he was an important contributor to one of the greatest discoveries in the history of science—the theory of evolution. The bones of various prehistoric animals dragged into their caves by the hyenas who once lived in England and France gave material help in establishing the theory.

A HORRID FEAST IN THE DESERT



These are Striped Hyenas, feasting on the carcass of some creature, killed by a lion, perhaps, and left half-eaten for the desert scavengers. Two Jackals have come up, and we can almost hear these four slinking cowardly creatures snarling at one another over the meal. Hyenas love bones, and so powerful are their jaws they can crack even the leg bone of an ox and so get at the marrow.

Scientific name, *Hyaenidae*, distinguished from all other large carnivora except the African hunting dog by having only four toes on each foot, by the length of the fore legs compared with the hind legs, and the non-retractile claws. Chief varieties: *Hyaena striata*, striped hyena, found throughout India, Persia, Asia Minor, and North and East Africa; *Hyaena crocuta*, spotted hyena, South Africa.

contained in the Easy Reference Fact-Index at the end of this work

WHY EVERYBODY IS DROWSY BUT BABY



In the cozy living room in winter, if you have no ventilation, pretty soon Father will begin to yawn, Brother will doze over his arithmetic, Mother over her fancy work, and Sister will look cross like that! Only Baby will keep lively and cheerful for a while, because the warm used air rises and so he has what little fresh air there is left down by the floor. But by and by, even Baby will begin to fret and cry and Mother will get a headache. Somebody must open a window or they will all be ill.

For any subject not found in its alphabetical place see information

YOUR HEALTH *and* HOW TO KEEP IT



HYGIENE. You live in a little house all by yourself. It is your body. People who own houses take care of them, and try to live in them just as comfortably as they can. The first thing necessary to live comfortably anywhere is to keep everything sweet and clean and in order.

It is much better to use a house than to let it stand idle. Things rust out quicker than they wear out. So it is with your body. You must use every bit of it, every day, and live in every corner of it. The bones and muscles become weak and stiff if they get no exercise. Working muscles and bone call for more blood. This compels the heart to beat faster and stronger, and the lungs to call for more air to keep the blood purified. All parts of the body should be exercised equally. Swimming, rowing, skating, bicycle riding, dancing, and just plain walking in the fresh air are splendid exercises. Games like baseball, football, basket-ball, and tennis are fine, too. They train both mind and body to think and act quickly (*see* Physical Training). Sweeping a room, hoeing a garden, and splitting kindling for mother are also good for the body. Laziness is rust for body and mind, as well as for the hinges of a door. Don't do anything halfway. Study hard and play hard while you are at it, and then rest.

Health is better than wealth.—*English Proverb.*
He who has health is rich and does not know it.—*Italian Proverb.*
Health and intellect are the two blessings of life.—*Menander.*
Health and good estate of body are above all gold.—*Ecclesiasticus.*
A healthy body is the guest of the soul; a sick, its prison.—*Lord Bacon.*
The first requisite of good generalship is good health.—*Napoleon.*
Strength of body and strength of mind, the reason of the sage and the vigor of an athlete, exhibit the most perfect model of a man and the highest refinement of the mind.—*Rousseau.*
When God would secure to man the highest, best-balanced, most long-continued action of mental and moral power, he does it by giving him a sound physique.—*Mark Hopkins.*
The first requisite of success in life is to be a good animal. In any of the learned professions, a vigorous constitution is equal to at least 50 per cent more brains.—*Mathews.*
No citizen has a right to be an amateur in the matter of physical training. What a disgrace it is for a man to grow old without ever seeing the beauty and strength of which his body is capable!
—*Socrates.*

Next, "don't worry!" You know "care killed a cat," and cats are supposed to have nine lives. Don't hurry, or overwork, or overplay. Don't lie awake and think about "that examination." If you do your best every day, you don't need to worry; and if you *don't* do your best, worrying will only make it worse. If your brain is to do good work it must have sleep. Eight hours for work, eight for eating and playing, and eight for sleep, is a good rule for grown people. Children should have less work, and more play and sleep.

Eat at regular hours. Eat enough at meal times and don't "piece" between meals. It takes several hours to empty a stomach. Don't make a meal of one kind of food because you like it. A dinner all of meat, potatoes, and pie is too heavy for any one but an ostrich. A mixed diet is best for human beings (*see* Food).

Wash your hands before you eat, or else you may get disease germs in your food. Take time to eat. Chew your food. Many grown people eat as if they had to catch trains. This is a greedy unpleasant habit. Besides, it is harmful. In chewing, the mouth makes a liquid (saliva) that the stomach needs for digestion. If you eat too fast, the mouth hasn't time to make enough of it. Besides, your teeth need exercise. The broad grinding teeth in the back of the mouth usually decay first. We use them less than we do the front cutting teeth. Don't overeat. If you fill a furnace too full of coal you smother the fire. Doctors often have to be called to help people digest their Thanksgiving dinners.

When you were rubbing yourself dry, after a bath, did you ever rub little rolls up on your skin? That was dead skin, dust, dried sweat, and oil. Warm water, soap, and scrubbing with a brush remove it. If not removed, it injures your health and makes you unpleasant to other people. To keep the skin clean and healthy, a warm bath with soap and flesh brush should be taken twice a week. Your hair must be shampooed as often as every ten days or two weeks, for dust, oil, perspiration, and dead skin collect on

the scalp, too. The hands and face are outside in all weathers, all the time, so you must get into the nooks and corners of ears, nose, knuckles, and finger nails every day. The teeth must be brushed after every meal, and the mouth rinsed. In a warm moist mouth bits of food quickly decay. You cannot keep your food grinders and cutters for 70 years unless you take care of them (*see* Teeth).

THE SIMPLE LIFE!



My! What a happy world this would be if we all followed Little Brother's example, and ate only simple meals at regular hours!

The morning shower or plunge bath in cool water, followed by a brisk rubbing with a coarse towel, brings the blood to the skin and makes you feel warm and bright and active. It makes you feel sudden changes of temperature less, so you do not "take cold" so easily. Don't forget to drink plenty of pure water. Drink four to six glasses a day, and more as you grow older. Water washes through all the waste pipes of the body and cleans them. It is best to drink before breakfast, between meals, and at bed-time. Water at meal times often dilutes the food in the stomach too much for proper digestion (*see* Digestion).

BEFORE EVERY MEAL



It ought to be a natural instinct not to sit down to a nice clean table with dirty hands, and yet many boys do it.

When the lungs are filled with air, they expand two inches or more. That is why your clothing should not be too tight. The lungs go down almost to the waist line. You should breathe deep and full. Clothing should be warm enough for the weather, but not so heavy that it tires you to carry it. The weight should hang from the shoulders, not from the hips. The shoulders were made to carry burdens. Weight on the hips and waist presses down the stomach and all the organs below it. Don't wear shoes in which you cannot wriggle your toes. Shoes for children should have straight broad soles.

Don't be afraid of fresh air. Use it all the time. There is plenty of it and it costs nothing. Your lungs do not like to breathe second-hand air. They need the oxygen that is in fresh air (*see* Air). A great many people are "afraid of night air." That is nonsense. Doctors cure people with sick lungs by having them sleep out of doors. You can keep your lungs well by sleeping with the windows wide open and putting on enough bed clothes to keep warm.

Breathe through the nose, not the mouth. The nose warms and moistens the air and has countless little hairs that catch the dust and keep it from getting into your lungs. If you cannot breathe through your nose, you probably have "adenoids," which are excessive growths of a tissue in the space between the back of the nose and the throat. Adenoids are bad for the health in many ways, and should be cut out by a specialist. Children who have adenoids, in many cases, also have enlarged tonsils, which cause frequent sore throat and other disorders, and therefore should be treated or removed (*see* Respiration).

Fresh air never made anyone "catch cold." But impure air, living in houses that are too warm and close, sitting in drafts, when overheated, and sitting with wet clothing and feet, will often break down the body's resistance and make you catch cold. Keep warm and dry, well-fed, clean, active, and cheerful; drink pure water and breathe fresh air; and you will keep well. Don't go where you know there is anything "catching." People used to think all children had to have measles, mumps, and whooping cough, and that these diseases were not serious. Now we know they are often serious, and that we may escape them if we avoid the germs that cause them (*see* Germ Theory of Disease). Scarlet fever and diphtheria are very dangerous. Don't drink from a public drinking cup, because it is likely to contain the germs of many diseases.

Finally, don't sit "humped up" in a chair or at a school desk. Raise your chest, hold your head up, whether you are sitting, standing, or walking. Wrong habits of posture make narrow chests, round shoulders, and curved spines.

A dentist should examine your teeth twice a year. Even the "baby" teeth should be kept clean and cavities in them should be filled. That will make them last longer, keep the stomach healthier, and make the second teeth stronger and better in every way. That saves money and pain, too.

AND THE TEETH!



Dirty teeth are not only very disagreeable things to look at—and to have—but they are a cause of disease.

If there are singing or buzzing noises in the ears, if the ears ache often or pus runs from them, or you cannot hear what people say to you easily, you should go to an ear specialist. Often ear troubles in children are easily cured, but if you neglect the trouble you may become very deaf. Often children in school are thought to be stupid when they are only hard of hearing (*see* Ear).

Your eyes are the windows of your soul. They should be clear and bright, for you cannot see through dim glass. If print blurs or spots dance before the eyes, if you cannot see with-

out squinting, or know the face of a friend across the street, or if you often have a headache after studying, when you feel well in other ways, you may need to wear glasses. You can injure good eyes in several ways. You must not read very fine print long, or read by a dim light. The light should fall on the page or the work you are doing, not in your eyes; and it should not dazzle. If your eyes feel tired, rest them by bathing them in cold water and closing them awhile.

Good mothers know a great many things to help boys and girls over small troubles. But if the trouble is something she doesn't understand, it is best to see a doctor. Don't take patent medicines. If you are so ill that you need medicine, probably you don't know the kind you need, nor how any kind will affect you. And a great many patent medicines have alcohol and dangerous drugs in them (*see* Drugs; Medicine and Surgery).

So much for the care of your body. But there is another side to hygiene that is just as important, that deals with the household and the community. Unhealthy housing makes unhealthy people.

The house in which you and your family live must be kept clean from cellar to roof. The basement should be light and dry and airy. No decaying vegetables or fruits should be left in it, for these poison the air of the living rooms above. Once a year the walls of the cellar should be whitewashed. The living rooms should be thoroughly cleaned at least twice a year, and the walls calcimined or painted once. If the walls are papered, the paper should be cleaned. Hardwood floors, with small rugs, are the best floor coverings because rugs can be cleaned out of doors and the floors washed. Iron or brass beds are cleaner than wood. Window draperies and all bedding should be washable. Vacuum cleaners or carpet sweepers and soft cloths should be used for sweeping and dusting, because brooms and feather dusters scatter dust. The waste pipes of kitchen sinks, laundry tubs, bathroom plumbing, and ice boxes become foul with decaying matter. They must be flushed every week or so with boiling water and washing soda or chloride of lime, to cut all dirt out. Sunlight and soap are great purifiers, so plumbing should never be boxed in. Old, dirty, boxed-in plumbing is often responsible for sewer gas or foul air about the house. The plumbing, the basement, the gas fixtures, the water supply, and the heating plant are the really important things in a house. A leak in a roof is a slight matter beside a leak in the gaspipe.

Stale food should not be allowed to remain in pantries and ice boxes. Garbage should be destroyed every day or carried away. There should not be a crumb of bread or sugar left lying about to coax flies in. Flies bring the germs of typhoid fever and other diseases, so doors and windows should be screened. Food should be fresh. Flour and many dry foods may be kept for months in dry storerooms. If unfit for use they smell moldy. Meat, butter, eggs, and milk also warn us of decay through our noses. Fruit that cannot be eaten while it is fresh should be preserved by cooking.

THE GOSPEL OF THE PUMP



Whether you get your water from the family pump or the city main, be sure to drink plenty of it. It's the best "medicine" in the world!

A family should be sure the drinking water is pure. Uncontaminated spring water is the best and purest of all. In cities, water is supplied to all the people from reservoirs fed by springs or rivers, or from a lake. Sometimes it is necessary to filter or boil the water. Boiled water should be cooled and air should be put back into it by pouring it from one vessel to another several times. This must be done because boiled water tastes "flat." It is not unhealthful, but people care so little for it that they will not drink enough. Water in city reservoirs is often purified with chloride of lime or other harmless chemicals (*see* Waterworks).

Heat is the next important thing. You do not want a hot-house. Hot-houses are useful for growing delicate plants. Hot dwelling houses grow delicate people. The temperature of a house should be 68 or 70 degrees by a thermometer hung in the middle of the room. And it should be an even temperature, not 85 for a little while and then 60. So the "fireman" of the family should study the heating plant. The house may be heated by stoves, or by a hot-air, steam, or hot-water furnace. Different stoves and furnaces take different kinds of fuel, and different ways of managing them to get the best work from them at the least cost. Sometimes badly managed furnaces give off a poisonous gas (carbon monoxide) that makes people ill. If the furnace is in order and

THAT'S THE WAY TO SIT!



When reading you should sit up nice and straight, like this. So many children get all humped up when they are reading.

FRESH AIR IS SO CHEAP



Some people, when they go to bed, shut their windows to keep out the night air. That's one of the best ways of catching cold.

the drafts are used properly, coal gases will go up the chimney.

Once in awhile you read about people being killed while asleep, with gas that escaped from a stove, a furnace, or a gas jet. This could not happen to people who sleep with the windows open, for the gas would pass out of doors, but enough might collect even in a well-ventilated house to make sleepers ill. No coal gas should escape from a furnace or stove, and gas pipes and burner keys should be tested often. Don't look for a leak in a gas pipe or gas stove with a match. Your nose is safer and just as reliable. You can always smell escaping gas. If you can't find the leak that way, send for a plumber. The leak may be from a pipe in a wall, or under a floor. A neglected leakage of gas may not only cause sickness, but also an explosion and fire.

Ventilation should be studied. Fireplaces are the best ventilators, even when there is no fire in them, for bad air is drawn up the chimney. A window lowered from the top a few inches in cold weather lets fresh air in between the sashes and the bad air out above.

What Makes Father Yawn So?

The time we need to be most careful about ventilation is in the winter. On cold winter evenings all the family likes to sit in the cosy living room. If the ventilation is poor, in an hour or two the oxygen supply in the room gets too low for comfort, and the carbon dioxide too high.

Look for these danger signals: Father begins to yawn. The lights do not burn so bright. Big brother feels dull and can't do his arithmetic. Sweet-tempered sister gets cross. The only bright and happy person in the room is the baby on the floor. The baby has the best air of all because warm used air goes up. But even the baby cries after awhile; the canary bird nearly tumbles off its perch and mother has a headache. The bad air almost fills the room. No one knows what is the matter. It's lucky if someone comes in from outside and says: "My, but it's stuffy in here." A window is opened and everyone brightens.

The next time that happens in your family, test the air in the room. Bring in a small glass jar of water and a bottle of lime water. Pour the water out of the jar and let it stand a few minutes to fill with the air in the room. Then pour a half-inch of lime water in the jar and shake it hard to mix the air and water. If there is too much carbon dioxide in the room the water will turn chalky. The remedy is fresh air. Air as bad as that ought to be turned out of doors. (*See* Heating and Ventilation.)

A house should be orderly, quiet, and cheerful. Loud noises really hurt many people. Nerves need rest as well as bones and muscles, brains, and stomachs. In cities, street-cars and railroad trains, factory whistles and wagons and noisy crowds are always hammering at people's nerves. Homes are the places to rest nerves. So don't slam doors or scrape your chair legs on the floor, or throw your shoes across the room, or shout to someone upstairs. You may yell on a farm, or at a baseball game where everyone is yelling. Very good people often quarrel and cry about little things, because their nerves are tormented all the time. Watch these danger signals. Sick nerves take a long time to cure.

Finally, don't take all your troubles into the house to talk over. Long ago a great poet said: "A merry heart goes all the day, a sad tires in a mile-a." This is just as true as that two times two are four. Laugh and grow fat, and save doctor bills. Bring all the cheerful things, the pleasant things, the funny things you come across, into the house. No family is as healthy as it might be unless it is happy.

What Hygiene Is and What It Does

Hygiene deals with the causes and prevention of disease in their relation to the preservation of health. In this sense hygiene has well been named preventive medicine, since it seeks to anticipate the work of the physician by its endeavor to remove the causes on which the diseases that affect mankind depend.

The advance of medical science—especially the progress which has been made in microscopic research into the causes of disease—together with the spread of education, has tended powerfully to awaken national endeavor in matters both of personal and public hygiene. Boards of health are maintained by both states and cities in the United States to enforce measures for the protection of the public health (*see* Health Department). One of the most important phases of their work is represented by the law which in many towns makes compulsory the notification to the authorities of every case of contagious disease which falls under the notice of the householder or medical attendant or both. The authorities, being early informed of the appearance of any cases of these diseases, can take prompt measures for their isolation and their removal, if need be, to the hospital. The seaports, too, are now narrowly watched by the health officers of these ports, and suspicious cases of illness on vessels arriving in harbor are at once dealt with.

Safeguards in the Home

Within the sphere of the home, health science has of late years made satisfactory progress. The principle of safe and sanitary drainage, whereby a house can be trapped off efficiently from the public sewers and the inroads of sewer gas prevented, is beginning to be practiced everywhere. Questions of ventilation and of lighting are being studied, and the warming of houses is no longer left to chance. Personal health, which ranges in its extent from questions of foods and drinks to those of cleanliness and clothes, is not neglected amid the general improvement in hygienic education. Happily, the people at large are beginning at length to perceive and to act on the great truth that only by their personal education in hygiene, and by their knowledge and observance of health laws, can they secure the length of days which of old it was declared Wisdom bore in her right hand.

HYGROMETER. One of the important factors which the Weather Bureau must take into account in making its forecasts is the humidity — the amount of moisture in the atmosphere. To measure this, various instruments are used, called "hygrometers." One of the simplest is the toy known as the "weather house," at the door of which a man appears if the weather is about to be wet, and a woman if it is to be fine. It is operated by catgut threads, which grow shorter as the humidity increases and lengthen as it decreases, thus moving the figures. Hair also contracts when moist, and is used in the hair hygrometer, moving a needle on a scale as it changes in length.

The wet and dry bulb hygrometer, also called the "psychrometer," is the most generally used. In the "sling psychrometer" type two thermometers are fastened side by side on a stand, exactly alike except that the bulb of one is covered with wet muslin. The thermometers are then whirled or fanned and the evaporation of the moisture in the muslin causes a fall in temperature in the wet-bulb thermometer — rapid if the day is dry, and slight if it is damp. The dry thermometer records the actual temperature of the air, and by comparing the two readings the humidity can be determined from a set of prepared tables.

Another type is the dew-point or condensing hygrometer. This makes use of ether, which evaporates very quickly and soon cools one of the thermometers down to the point at which the moisture in the air begins to condense as dew. From the dew-point and the temperature of the air as given by the other thermometer, the relative humidity can be determined. In chemical hygrometers the moisture in a given volume of air is absorbed by some such substance as calcium chloride or sulphuric acid, and the increase in weight gives the amount of moisture.

Hygrometers are used in many modern schools and office buildings to measure humidity so that moisture can be thrown into the air when the air becomes too dry (*see* Heating and Ventilation). They are also used in industries in which humidity is a factor, such as the manufacture of textiles, cigars, and paper.

MEASURING AIR MOISTURE



In this type of hygrometer, the "bulbs" are closed tubes filled with a volatile liquid and mounted on a frame with the dry bulb in front, just beneath the coiled tubing at the top. A cloth covers the wet bulb and is kept uniformly moist by the water in the tank into which it dips. The tubing connects the bulbs with hollow metal coils in the circular metal case, and when changes in temperature cause the vapor in the tubes to change in volume, these coils expand or contract. This movement shifts the needles over the face of the card, which is kept slowly turning by clockwork. The combined movements trace a temperature record for each bulb. By referring the differences in temperature to special tables, the humidity at any time can be determined.

HYPNOTISM. Many strange occurrences which were once looked on as miracle, magic, or delusion have been explained by modern science as results of that little-understood mental condition known as "hypnosis" or hypnotism. This condition resembles normal sleep, except that the hypnotized subject may retain some of his active faculties such as the power to walk, talk, and understand what is said to him. At the command of the operator the patient will lose all sensation in a leg or an arm, so that a pin can be thrust in without pain. The heart-beat can be made slower or faster, a rise in temperature and perspiration can be induced, and there are records of cases where drops of blood were made to ooze through the skin. The hypnotized person will perform ridiculous actions, and carry out feats of skill and strength impossible to him under normal conditions. He will "see" people who are not there and if told that a person, who may actually be directly in front of him, has departed, he will believe it, and may even try to walk over the spot where that person is standing.

In light hypnosis a person may remember the facts of his normal life and may recall when he "wakes up" what he said and did while hypnotized; but deep

hypnosis produces a complete loss of memory in both respects, unless the operator orders the patient to remember something. Perhaps the most useful feature of hypnotism is found in what are called "post-hypnotic suggestions." These are suggestions made to the patient while hypnotized, which he will carry out afterward. For instance, if the operator tells him that, when he awakens, he must take off his coat as soon as someone coughs four times, the patient will do so, without being conscious of the reason for the action. It is this effect of hypnotism which is used by certain medical specialists in breaking drug habits and other forms of nervous diseases.

How the Hypnotist Controls His Subject

To understand even the simplest facts of hypnotism, it is necessary to realize the close connection between the mind and the body through the nervous system, which centers in the brain. In sleep the faculties of the conscious brain become dulled and lose connection with the body and with each other. But it is possible to keep one or more of the faculties half awake, as in the case of the fireman who sleeps through any amount of ordinary noise but springs up at the faintest tinkle of the fire alarm. A similar condition is produced in hypnosis. All the conscious faculties are put to sleep, except the faculty to respond to suggestions of the hypnotist. The hypnotist's mind and will take the place of the patient's mind and will, and since most of the ideas which might lead the patient to refuse a suggestion are asleep, the body, which remains active, will answer to his commands. The nerve system, which controls the body and carries sensations to the brain, also remains sleeping until it is called into action, and then it may act most powerfully because it is free from the ordinary burden of the thousands of ideas and sensations which make up our waking life. Thus the nerves of the heart and other organs, which work automatically and cannot ordinarily be controlled, become open to suggestion.

The methods used to produce hypnosis are usually simple. The patient is asked to fix his eyes on some nearby object and to make his mind a "blank" as far as possible. The hypnotist says a few low soothing words and may even stroke the head or pass his hands before the eyes. A condition resembling natural sleep sets in, except that the operator keeps the patient's attention and prevents complete slumber. Contrary to popular belief, it is almost impossible to hypnotize a normal person against his will, or cause him to do acts which are contrary to his deep-seated principles.

Some forms of hypnotism have been practiced for centuries. Many of the wonders performed by so-called "magicians" and religious fanatics were doubtless due to the exercise of hypnotic influence. Self-hypnosis is probably responsible for the ease with which Hindu fakirs bear excruciating pain.

When hypnotism first began to be studied, it was called "animal magnetism" or "mesmerism," after Dr. F. A. Mesmer of Vienna, who used it to heal certain nervous ailments in the late 18th century. It remained a great mystery, however, and was generally associated with superstition and fraud, until modern psychology gave it a firm basis in science.

Hypnotism and Telepathy

There are many points of resemblance between hypnotism and telepathy, which is the power to transmit ideas direct from one person to another, even at a great distance, without using the ordinary channels of sense. The fact of telepathy is well established, but theories on the subject are still very vague. Cases in which a person receives vivid pictures of some mishap to a friend or relative, who may be hundreds of miles away, are common. Hypnotic effects have been produced by telepathy when patient and operator were in separate rooms. The powers of clairvoyants, who claim to be able to read the mind and to see things not visible to the normal senses, are supposed to be based, when they are genuine, upon some form of telepathy. But the majority of mind-readers, like most fortune tellers, depend upon fraud in their performances.

The general warning of scientists in all of these puzzling subjects is to avoid taking them too seriously. The practice of hypnotism, while it is usually harmless, may result in upsetting the mental condition of nervous patients, and it should only be employed by expert operators for some beneficial purpose.

IBAÑEZ (*ē-bä'nyăth*), VICENTE BLASCO (born 1867). Spain was kept neutral by German intrigue throughout the World War of 1914–18, but from that land came the novel which contained the most bitter and scathing indictment of German war policy, and some of the most realistic pictures of battle scenes and war devastation. Translated into English it became one of the "best sellers" of the United States. Its title, 'The Four Horsemen of the Apocalypse', refers to the four riders of the Book of Revelations to whom in the dread day of the opening of the seals was given power "over the fourth part of the earth, to kill with sword, and with hunger, and with death." Its chief characters are a wealthy family of Spanish-Americans from Argentina who came to Europe and are drawn into all the horrors of war as the German armies sweep ruthlessly over northern France.

Blasco Ibañez, the author of this work, is one of the most popular writers of Spain today. His father, a merchant of Valencia, Spain, sent him to study law at the University of Valencia. But the young man's disposition proved too restless and vigorous for the practice of law. He took to journalism and became so revolutionary in his views that he served a term in prison before he was 18. But Blasco Ibañez remained constant to the cause of freedom and progress and became one of the leaders of Spain's republican party.

Next to 'The Four Horsemen of the Apocalypse' (1916), his most widely read work is probably 'Mare Nostrum' (Our Sea) published in 1918. This tells the story of how a Spanish captain is lured by the wiles of German intrigue into carrying fuel to a German submarine. By a strange stroke of fate, the captain's son is drowned by that very submarine. Henceforth the broken-hearted father devotes his life to warring against the German pirate-craft. The novel's chief interest, however, lies in its superb descriptions of the Mediterranean Sea (*mare nostrum*), and its wonders of marine life. The earlier novels are chiefly protests against social abuses in Spain.

Among the other works of Blasco Ibañez are 'La Barraca' (The Cabin), 1899, a story of the miseries of peasant life; 'Sangre y arena' (Blood and Sand), 1908, a powerful attack on the sport of bull-fighting; and 'La Catedral' (The Shadow of the Cathedral), 1903, a study of the great cathedral of Toledo and its effect on those who spend their lives in its shadow.

WHAT A SPLENDID PAIR OF HORNS!



This is an Ibex on a high rock of the Himalayas. We may know that this is not an Alpine goat, for look what a long beard he has! The beard of an Alpine ibex is so short you can hardly notice it. The horns of the Asiatic ibex are much longer, too.

IBEX (*ī'bĕks*). The home of the wild goat called the ibex is among the most precipitous and inaccessible heights of the Alps, Pyrenees, Caucasus, and Himalaya mountains. It lives habitually above the line of perpetual snow, only descending to graze at night.

The splendid horns of the male, 30 to 60 inches long, rise from the crest of the skull in a long graceful backward sweep, and are marked on the front with bold cross ridges. The fore legs are shorter than the hind legs, making it easier for the animal to go up a slope than down. The hair is reddish-gray, growing longer in winter.

Ibexes feed in small herds, but the older males usually live alone and at higher levels than the females and the young. The Alpine ibex is now rare and is protected by law. In Asia hunting the ibex is a favorite sport.

Scientific name of the Alpine ibex or steinbok, *Capra ibex;* of the Nubian or Arabian ibex, *Capra sinaitica;* and of the Himalayan ibex, *Capra sibirica.*

Ibsen, Henrik (1828–1906). Had the circumstances of this noted Norwegian poet and dramatist been easy, and had he success earlier in life, his work would probably have been of a different character; for until he was nearly 40 years old and disappointed by failure and neglect his interest was chiefly in Norse history and legend. Born at Skien, southern Norway, he was because of poverty apprenticed to an apothecary at Grimstad when still a boy, and suffered seven years of drudgery at distasteful tasks. At the age of 19, when he began to write poetry, he appeared to his unsympathetic townsmen as "a gloomy and sinister youth." Unhappiness so spurred him to effort that at 22 he had prepared himself for entrance to the University of Christiania, and had written a tragedy in blank verse. Unable to remain in college long enough to be graduated, he did poorly paid newspaper work, managed a small theater, studied scenic art in journeys to Denmark and Germany, and wrote lyrics and unsuccessful plays for a dozen years.

Finally He Wins Success

The most original of modern dramatists, Ibsen was long in discovering his true bent, and he waited still longer for recognition to lift him above want. His 'Warriors of Helgeland', which marked an epoch in Norwegian literature, and 'Love's Comedy', the first of the social satires for which he is particularly famous, were coldly received at first. In bitterness of spirit, Ibsen left Norway. Two years later, in 1866, he flung back from Rome his splendid poetic drama, 'Brand', and aroused his native country to tardy acknowledgment of his genius. The Norwegian parliament granted him a pension and asked him to come home, but until 1892 he chose to live abroad.

Success won, he devoted himself to writing satiric comedies of modern social life. Setting himself seriously at work to diagnose the ills of society, he abandoned verse and wrote crisp dialogue in everyday language. Misfortune had developed in him a biting irony; and his plays were so audacious, pessimistic, and scornful of social hypocrisy, that they could not be ignored. He challenged heated discussion and was denounced as "immoral." Ibsen's only reply was sarcasm and defiance. His own opinion he put in the mouth of one of his characters: "A minority may be right, a majority is always wrong."

Fame Spreads to Foreign Lands

His recognition was greater abroad than in his native land and amounted to an Ibsen cult in England and America. By some he was held to pose as a moral teacher, like Tolstoy, but this Ibsen himself denied. He was simply a commentator, prescribing no remedies for social evils; and in time it was recognized that his chief claim to distinction was as a playwright. He scorned the "happy ending," and restored to the sentimentalized drama something of Greek simplicity and logic. His plots are masterly, his dramatic sense unerring, his dialogue lifelike. His plays have been translated into all European languages, and presented by gifted actors of many lands; and it is not too much to say that he revolutionized the drama of Europe and America (*see* Drama). He continued to write with vigor until a few years before his death, which occurred at Christiania, Norway, at the age of 78.

To English readers and playgoers Ibsen's best-known works are 'Brand' (1866); 'Peer Gynt' (1867); 'The Pillars of Society'(1877); 'A Doll's House, or Nora' (1879); 'Ghosts' (1881); 'Hedda Gabler' (1890); and 'Little Eyolf' (1894). But in his complete works a total of more than two dozen dramas and dramatic poems are listed.

Ice. When water is sufficiently cooled it becomes filled with a multitude of six-sided needle-like crystals, which increase and interlace until the whole mass becomes solid ice. In water which freezes naturally this change to a solid state begins at the surface and spreads gradually inward. When the freezing process is complete the crystals are so closely packed that they cannot be separately discerned. Fresh water normally freezes at 32° Fahrenheit and 0° Centigrade at atmospheric pressure, salt water at a lower temperature. But if oil is poured over water in a vessel, and the vessel is kept absolutely still, the water may be cooled to 10° Fahrenheit without freezing. If the vessel is slightly shaken or jarred, however, the water solidifies at once. Water expands upon freezing by one-eleventh of its own bulk.

Natural ice is still harvested in large quantities in winter on lakes and rivers, and stored for commercial use. Artificial ice, however, is now more frequently used, as it can be produced on a large scale at all seasons of the year where wanted and so save transportation. (*See* Freezing; Refrigeration.)

Ice age. Many thousands of years ago, when the mammoth and the mastodon still roamed the trackless forests of North America, vast ice sheets formed over the northern part of this continent, and over much of northwestern Europe. The ice was so deep that only the highest mountain peaks were visible above it. The ice sheets were formed from snow, which must have fallen in great quantities when the climate was not warm enough to melt it.

In North America the ice reached great thickness; (1) in Labrador, (2) near the western shore of Hudson Bay, and (3) in the mountains of British Columbia. From these areas, the ice seems to have moved out slowly in all directions, but especially southward. The White Mountains of New England were covered, the ice at this point being 4,000 or 5,000 feet thick at least. In southern Connecticut it was something like 1,000 feet thick. The southern border of the ice sheet crossed Long Island, northern New Jersey, Pennsylvania, southern Ohio, Indiana, and Illinois. West of the Mississippi its southern border was not distant from the Missouri River, as far west as Montana. In Europe the ice was at least 6,000 feet deep in Norway. Scotland, Ireland, and all but the southern part of England were covered by ice which was continuous across the North Sea with the Scandinavian ice cap. Much of Germany and Russia were buried beneath great thicknesses of ice.

The glacial period, or ice age, consisted of several glacial epochs, separated by interglacial epochs of milder climate, during which the ice sheets were reduced, or perhaps disappeared altogether. The last glacial epoch ended some 25,000 years ago, as nearly as is now known. The first glacial epoch of the period was perhaps 40 or 50 times as long ago. The melting of the ice produced great quantities of water, which gathered into lakes wherever basins were present. The lost Lake Agassiz, which once covered 110,000 square miles in Minnesota, North Dakota, and Manitoba, was thus formed. It was 700 miles long from north to south. The Great Lakes, after the ice melted back north of their borders, were all larger than now.

The melting of the last ice sheet left a thick deposit of débris, called "drift," on the surface which it had covered. The drift consisted of rocky and earthy débris which the ice had scraped and broken off from the land over which it passed. The irregular distribution of the drift, as well as the erosion of the ice, left many depressions without outlets in the surface, and in these depressions ponds and lakes were formed. Thus arose most of the lakes, ponds, and marshes of the great area of about 4,000,000 square miles covered by the ice sheets of North America.

Scattering Rocks Broadcast

Indeed, the ice sheets made great changes in the physical features of the regions it covered. In addition to the lakes, they left the surface strewn with bowlders of various kinds of rock, some of them of great size. Some of them had been transported hundreds of miles from the places where the ice broke them from the bedrock. Some of the lakes, like the "Finger Lakes" of New York, occupy basins made by the damming of river valleys by drift which the ice left. The many waterfalls within the area covered by the ice, both in the east and west, are in most cases due to changes of drainage caused by the great glacier; for many of the earlier valleys were filled by the deposits made by the ice, and when it melted, the surface waters sought new courses. In the glaciated area there are many peatbeds, formed in marshes which developed in shallow basins in the surface after the ice sheet melted.

The ice, which encroached gradually on regions previously warm, must have submitted all living things to new and disturbing conditions. In consequence some animals became extinct at this time, others moved southward. Thus the musk ox, which now lives in the Arctic region, was driven south before the ice to West Virginia and Kentucky. Man existed in Europe during the early interglacial epochs, but there is yet no evidence that he existed in America until after the close of the last epoch. (*See* Cave Dwellers; Man.)

The cause of the development of these prodigious ice sheets is not known with certainty. Some scientists have believed that it was due to the temporary elevation of those parts of the earth where the ice gathered; but this view does not find much support in fact. Others have attributed the ice age to astronomical causes. This explanation also seems untenable, in the light of known facts. At present, the most probable hypothesis is that great changes in climate are the result of changes in the constitution of the atmosphere. If, for example, the amount of carbon dioxide in the air were to be increased, the temperature of the earth would rise; if decreased, the temperature would become colder. Rational explanations of variations in the amount of carbon dioxide can be suggested. (*See* Geology; Glacier.)

Icebergs. Shortly before midnight on April 14, 1912, in the waters of the Atlantic about 1,600 miles northeast of New York, there occurred one of the greatest marine disasters in all history. The giant steamship *Titanic*—the largest vessel then afloat—was making her maiden trip from Liverpool to New York, when she suddenly struck the under-water shelf of an iceberg. Two hours later the ship sank, sucking down all but 706 of her 2,300 passengers, with a property loss of $15,000,000. In answer to frantic wireless calls the *Carpathia* at last reached the spot and picked up survivors from rafts and life-boats. But the iceberg had done its deadly work.

Icebergs are at once the dread of sailors and the wonder of all who look upon them. They are the broken-off ends of glaciers that descend to the sea. They vary in size from tiny cakelike "growlers" to great masses a mile or more in diameter. Although some icebergs are as much as 200 feet above the water, we must remember that "their green roots sleep in the awful deep—two hundred fathoms low." That is, only an eighth or a ninth of the weight of the ice is above the surface of the ocean.

These wanderers of the sea overwhelm the onlooker with their beauty. Over their dazzling surface of solid ice tints of delicate green mingle with blazing sapphire veins, with deep dove-colored caverns carved by hungry waves, and, at dawn and sunset, with glints of purple and azure and rose. As they drift along, now and then breaking, turning, sloughing off great fragments with a tremendous crash, many of them assume fantastic shapes—like castles, triumphal arches, or domed mosques.

Once afloat, icebergs are soon melted by the warmer ocean water and the sun. Some bergs, however, are so huge that they travel 2,000 miles or more before wholly disappearing.

New icebergs are being formed constantly. Some Arctic glaciers have been estimated to furnish as much as 200,000,000,000 cubic feet of ice to the sea each year in the form of icebergs. Most bergs in the north Atlantic come from Greenland's great ice cap. Here in early spring a great procession of floating ice islands begin their journey southward and somewhere around April, May, or June they reach the northern Atlantic steamer routes.

Two routes are particularly dangerous during the iceberg season: one through the Straits of Belle Isle into the Gulf of St. Lawrence; the other by way of the

THE GREAT WHITE PERIL OF THE OCEAN LANES



The giant liner 'Titanic' with over two thousand persons on board, was plowing her majestic course through the Atlantic on the fatal night of April 14, 1912, when she struck the underwater shelf of an iceberg, and two hours later sank to the bottom of the ocean, sucking down all but 706 of her passengers and crew. Notice how small a proportion of the whole mass of ice is above the water, only about one-ninth of the iceberg's bulk. It is this that makes these floating islands so dangerous to passing vessels.

"Grand Banks." Sailors do their best to avoid the bergs by taking more southerly routes. The United States Hydrographic Bureau issues monthly charts locating the principal groups of bergs, and these help the sailors to determine their paths of travel. At night the bergs glow with a peculiar whiteness called "ice blink," due to the reflection of scattered rays of light from the sky on the white surface of the ice. Often the presence of birds far from land or the absence of waves means that floating ice is near, as does the sudden echo from a whistle or a horn. On foggy days bergs may loom up darkly against the white shadowless fog particles. No reliance can be placed on ordinary measurements of either air or water temperature as a means of detecting the nearness of a berg, but a microthermometer for recording one-thousandth of a degree has been recently invented which is expected to prove valuable in detecting icebergs. (*See* Glacier.)

ICELAND. As a little shipload of Norse colonists neared the unknown shores of Iceland in 874 A.D., their hearts beat fast with wonder and joy at sight of the Arctic sun glittering on snow-clad domes, towering cliffs, naked volcanoes, and ice-bound waterfalls.

"This oath I make fast," said one of the chieftains, casting the wooden columns of his ancestral hall into the sea, "and swear before these pillars sacred to our gods that upon whatever part of the coast they drift there will we found our colony!"

Today the descendants of these Norsemen, who were seeking escape from the tyrant King Harald, are still to be found in this

THE ICELANDER AND HIS NATIVE LAND





In the upper picture we are looking down a business street in Reykjavik, the capital of Iceland. Reykjavik has substantial and attractive business houses and homes built of brick and painted white. It is a busy city of 15,000 people, exporting cod and herring. It has fine public schools. The lower picture is a scene on the northern coast of Iceland. At the base of the mountains is a little fishing and whaling village. This fine old gentleman is a typical native of Iceland.

"island of ice and fire," washed by the Atlantic and the cold blue Arctic Ocean. And the Icelanders today are as plucky as were their ancestors of old. They live in towns and scattered farms along the foggy coasts and the damp sheltered valleys of the fiord-indented lowlands, for only this one-seventh of their island is habitable. Many are the anxious glances they cast behind them at the rugged table-lands, a region of lava deserts, sand wastes, giant glaciers, and mammoth waterfalls—larger than any in Europe. For in this weird hinterland are boiling mud springs and geysers which hurl torrents of water high in the air, while more than a hundred great volcanoes tower in the background with a regiment of ice-clad peaks. From these come stupendous eruptions and earthquakes that wipe out great tracts of cultivated land and often take a horrible toll of lives. The Icelander still shudders when he thinks of Mt. Laki's



YOUNG ICELANDERS



One, two, three, four, five, six little Icelanders all in a row! And everyone of them is a "towhead"; for they are Scandinavians, remember.

activity in 1783, which destroyed four-fifths of Iceland's live stock, devastated much of the land, and together with the resulting famines and epidemics killed over one-fifth of the population.

Although the surrounding oceans make Iceland warmer than its latitude (63° 12′ to 66° 33′ N) would suggest, the climate is nevertheless raw, cold, and variable — often snowy—the year round. And Iceland folk for the most part can earn their monotonous living only by tending small crops of hay, potatoes, and turnips, by watching over cattle, sheep, goats, and little Iceland ponies that graze in scattered pastures, and by fishing in stormy seas for cod, herring, and shark. Sea harvesting gives the Icelander the greater part of his exports; his cod fisheries are among the most important in the world, attracting many foreign fishermen. Tallow, wool, hides and skins, sheep and horses, salted meat, and eider-down are other exports. The trade is chiefly with Denmark, Great Britain, Norway, and Sweden. There are no manufactures. The mineral wealth (which includes Iceland spar, a transparent variety of calcite used in making optical instruments) remains largely undeveloped.

Despite all handicaps the Icelanders are a sturdy, law-abiding, and progressive people. Educational standards are high, and more books are printed and sold in proportion to the population than in any European country. Iceland has also had prohibition and woman suffrage for many years.

The Icelandic language is closely related to the old Anglo-Saxon. Because the country is shut off from other lands, Icelandic has changed so little from the language of the early Norse settlers that even the little children can read the fascinating ancient sagas of old Icelandic heroes, some of which rank as masterpieces of literature. In the present day Iceland still has distinguished literary representatives, particularly in poetry, drama, the novel, and translations.

Iceland lies 150 miles east of Greenland and 500 north of Scotland. With its area of almost 40,000 square miles, it is one-third the size of Great Britain. Only about ¼ of one per cent is under cultivation. Its history begins with its settlement by Norse colonists in the 9th century. In 1264 it was annexed to Norway; and later fell with Norway under Danish domination. Since 1918 it has been an independent state, united with Denmark only through having the same sovereign. Its capital, Reykjavik, has a population of 15,000. Population of Iceland, about 92,000

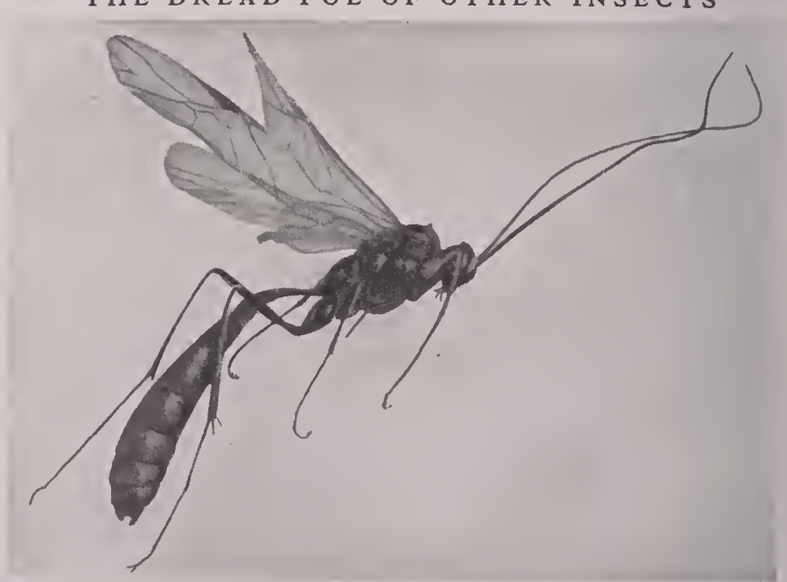
ICHNEUMON (*ĭk-nū′mŏn*). The common name for a number of small weasel-shaped mammals of North Africa. The East Indian representatives of the group are called "mongooses" (*see* Mongoose). The Egyptian ichneumon (*Herpestes ichneumon*) ranges over Egypt and the north of Africa, where it is known to foreigners as "Pharaoh's rat"; it also occurs in the south of Spain. It eats the eggs and young of reptiles and birds. Because of its fondness for rats and mice it is often domesticated.

ICHNEUMON FLIES. These beautiful flies, with their four gauzy wings, are invaluable allies to the farmer. They destroy the young or larvae of many harmful insects, such as the army-worm and the tussock-moth, by laying eggs in their bodies. When the larva of the ichneumon fly hatches, it slowly eats its way into the other larva and thus kills it.

Ichneumon flies vary in size, but all have long slender abdomens with long legs which trail gracefully as the insect flies through the air. From the abdomen of the female extends a thread-like egg-laying organ called an "ovipositor" (egg-depositor). In some species this organ reaches the amazing length of eight inches.

Scientific name, *Ichneumonidae;* order, *Hymenoptera* More than 650 species have been described. One of the largest in America is the *Thalessa*, which measures 10 inches from the tip of the antennae to the tip of the ovipositor.

THE DREAD FOE OF OTHER INSECTS



The Ichneumon Fly, shown above, lays eggs in the larvae of other insects, and the young Ichneumon grub soon kills its host.

The LAND of the COEUR D'ALENE and SHOSHONE



Mountain scenery like this earned Idaho its name, which means "Gem of the Mountains." Here you see the forests growing in evergreen masses, and above them the snowy crests that feed the clear flowing streams and the magnificent waterfalls. And somewhere back there in the mountains you are sure to find beautiful sparkling lakes.

Extent.—North to south, 485 miles; east to west, from about 45 miles on the northern border to 310 miles on the southern border. Area, 83,888 square miles. Population (1920 census), 431,866.

Physical Features.—Coeur d'Alene, Bitter Root, and Salmon River Mountains (highest point, Hyndman Peak, 12,078 feet). Principal rivers: Snake (Shoshone Falls, 190 feet), Salmon, and Clearwater. Lake Pend d'Oreille.

Principal Products.—Hay, wheat, oats, sugar beets, and potatoes; cattle, sheep, wool, and dairy products; lead, silver, copper, gold and zinc; lumber and timber products, flour.

Chief Cities.—Boise (capital, about 22,000), Pocatello (15,000).

IDAHO. Because of its wild and romantic beauty, the Indians gave the name "Idaho," meaning "Gem of the Mountains," to the region now comprised in this state. The more realistic pioneer settlers called it "The Panhandle State" because of its unusual shape. Idaho is one of the states carved out of the Oregon country, the title to which was settled by treaty with England in 1846. Starting east of Washington with a boundary of only 45 miles on the Canadian border, it follows the line of the Cabinet, Coeur d'Alene, and Bitter Root mountains, thrusting southeast along the border of Montana until it reaches a width of 325 miles between Oregon and Wyoming.

Scarcely anywhere in the United States are there mightier mountains, greener meadows, fatter farms, or a more generous store of fine and precious things than in Idaho. The face of the country is rough with mountains, spangled here and there with small bright mountain lakes, and many of its streams glide to the sea between the deep lips of long canyons—the poet's "waters between walls of shadowy granite, in a gleaming pass." Heavy forests grow in evergreen masses on the sides of the snow-crested ranges, and the clear streams flung down their sheer rocky sides make long white waterfalls that rival Niagara in grandeur. Shoshone Falls, where the Snake River plunges 190 feet into a dark-green lake at the bottom of a deep gorge, is exceeded in magnificence only by the falls of the Niagara and Yosemite. This incalculable supply of water power is one of the state's greatest assets and is being more and more used to turn wheels and to make electricity for the state. Water-power plants have been developed at American Falls, Minidoka Dam, Arrow Rock Dam, Shoshone Falls, Swan Falls, Salmon Falls, the Thousand Springs, and Twin Falls.

On the slopes of the low round foothills are spread fields of wheat, oats, and alfalfa; and vegetables and fruits grow in the fertile valleys. Cattle graze in the tall grass of the upland valley meadows and on the wide plateaus. Geologists come from far away to study the lava beds of central and southern Idaho, which were poured down long ago from volcanoes now old and dead, and which the rain and frost and winds of millenniums have broken up into a soil of unusual fertility. And sick people come to the healing waters of the hot and mineral springs, which are so numerous that water piped from warm springs is used in winter to heat houses in Boise, the capital city. Other springs supply water almost ice cold all summer long. Currents of cold air from deep wells are used on many farms for refrigeration.

Mountainous Idaho, lying at so many different altitudes beneath the northern sun, necessarily has a widely varying climate. The southern and central sections are arid, with practically no rain in the summer, but with heavy snowfalls in winter. In the higher regions the winters are long and severe, but the lower valleys, sheltered by the Rockies and swept by winds from the Pacific, have mild winters. Even

A LAND OF WEALTH IN MOUNTAIN, FOREST, AND STREAM



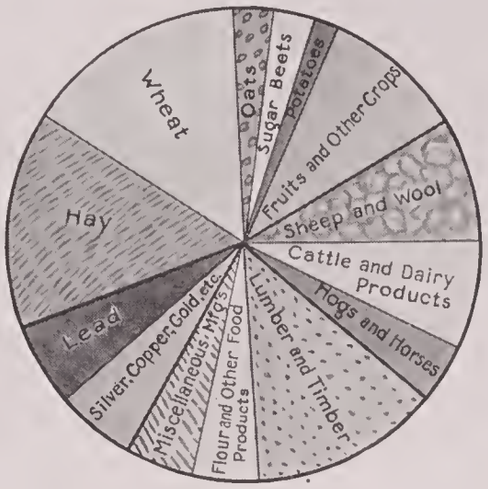
Latter Day Saints (Mormons)	Roman Catholic	Methodist	Presbyterian	Baptist	Disciples of Christ	Other Denominations

Notice, first, Idaho's peculiar shape which brought it the nickname of the "Panhandle State." Next see what a great number of rivers course through the valleys lying between the mountains that furrow nearly the entire state. Along the course of the great Snake River have been built some of the greatest irrigation projects in the country, adding to the wealth of Idaho's forests and mines the products of countless irrigated farms. Below the map the religious denominations of the state are compared.

some of the higher valleys are so sheltered that cattle can roam throughout the winter, and spring comes back to parts of Idaho long before it reaches some states lying in latitudes far more southerly.

A few rivers to the north flow off into the Columbia, but most of the state is drained by the long curves of the Snake River, winding in a tremendous canyon for 350 miles across the southern part of the state and for 200 miles along its western boundary. Much of this precious water supply, and also that of the crystal mountain lakes, is being developed for irrigation, particularly on the great intermountain plateau along the course of the Snake. Here are some of the largest irrigation systems in the country, with great dams and reservoirs and more than 10,000 miles of canals costing in the neighborhood of $100,000,000. Thus what was once a frowning desert has been transformed into the best farming land of the state. Wheat, alfalfa, timothy, and oats grow here lux-

uriantly, as well as in the fertile northern valleys where no irrigation is needed; in the arid southeast especially fine macaroni wheat is raised by dry farming. Sugar beets and potatoes are also important crops. The northern valleys are also famous for their fine orchards of prunes, apples, apricots, pears and peaches. Idaho has been one of the greatest sheep-raising states, ranking with Texas and California in numbers of sheep, and numerous herds of cattle have roamed its plains, but the newer dairy industry now bids fair to rival even sheep raising.



Sources of Idaho's Wealth

Another enormous industry is that of lumbering; more than a third of the area of the state is covered with forests, most of them under national control. The lumber mill at Potlatch is said to be the largest in the United States and the second largest in the world. The white pine forests in northern Idaho are among the largest in the world as well as the most valuable, and the lumberers also have great fragrant stretches of red fir, Douglas fir, yellow pine, spruce, hemlock, and juniper to draw on; there is even a little hardwood to be had in the forests of black cottonwood which grow to the north in the valleys and around the marshy lakes. Vast fortunes have been made from Idaho timber.

Another source of Idaho's wealth is her mineral deposits. In some sections the Idaho earth is threaded with gold, silver, lead, zinc, copper, coal, cobalt, and building stone. In silver and lead production Idaho is among the leading states. The arid southeastern plateau contains perhaps the richest deposits of phosphate rock in the world.

Aside from the products of the sawmills and planing mills, and the beet sugar factories, the flour and grist mills, and the dairies, the state has developed no important manufactures; though concrete, packed meats, and fruit drying and canning are growing industries.

The first white men known to have explored Idaho are Lewis and Clark (*see* Lewis and Clark Expedition). Settlement was slow, until the discovery of gold and silver, in 1860, started a rush of prospectors to the Boise basin. Three years later the region was organized as a territory, including Montana and part of Wyoming. The creation of those two states later left Idaho with its present irregular outline By 1890 it had a population large enough to be admitted into the Union as the 43d state.

THE CAPITOL BUILDING AT BOISE



Boise, the capital of Idaho, stands on the site of a former fur trading post of the Hudson's Bay Company. A United States military post was established here in 1863, and the next year the city was organized as the capital of the territory. The famous Arrow Rock Dam 27 miles away, provides electric power for the city as well as irrigation for the rich surrounding territory.

Occasional Indian outbreaks harassed the early settlers, but in 1877 all the Indians had been driven to the reservations provided for them. Like Nevada, Idaho received many Mormon settlers, who came in such numbers that 40 per cent of the population today is Mormon. In 1883 the legislature deprived the Mormons of the right to vote, but 10 years later, when the Mormon church gave up the principle of polygamy, all Mormons with one wife received the franchise again. From 1892 to 1899 a number of serious mine strikes occurred. In 1905, Gov. Frank Steunenberg, who had opposed the miners, was assassinated.

RICH INDUSTRIES AMID BEAUTIFUL SCENERY



This is the great lumber mill of the Potlatch Lumber Company at Potlatch, Idaho, which helps to turn into lumber the fine trees of the great forests which cover a third of the State. This mill is said to be the largest in the United States.



In this mill at Morning Mine, Mullan, Idaho, a thousand tons of ore are crushed daily and so reduced to the form in which the ore can be handled by the smelter where the lead and silver are melted out.



At the Shoshone Falls, the waters of the Snake River take a sudden plunge of nearly 200 feet. These falls for their impressive beauty have been compared to those at Niagara.

For any subject not found in its alphabetical place see information

IDAHO WOOL "ON THE HOOF"



What a lot of nice woolen clothes and dresses and blankets and things are going about here on four legs, cropping close the grass of the Idaho plains! This is a snapshot of part of a flock of 37,000 sheep owned by one of the big ranching companies of Idaho. This state ranks with Texas and California as one of the great sheep-raising states.

Idaho's recent history has been less turbulent, as the agricultural population has increased. Although the state's rate of growth has been rapid—it doubled its population every decade from 1870 to 1910—it is still thinly settled. Twice the size of Ohio, it has less than one-tenth the population. Little more than 10 per cent of the state's area of about 84,000 square miles has been brought under cultivation, so that its possibilities of development, under irrigation and modern dry-farming methods, are still great. Politically Idaho has been distinguished for its progressiveness, giving the franchise to women in 1896, introducing the initiative, referendum, and recall in 1912, and state-wide prohibition in 1916. By the state constitution all the waters of the state are reserved for public use.

Boise, the capital, lies in the southwestern corner of the state on the Boise River. The state university is at Moscow, about 200 miles north of Boise on the Washington border. State normal schools at Albion and Lewiston, a technical institute at Pocatello, and an Industrial Training School at St. Anthony, are some of the other educational institutions of the state. The state maintains a school for the deaf and blind, an orphanage, and two insane asylums.

IGUANA (*ĭ-gwä'nȧ*). This fantastic family of lizards, great and small and varying widely in appearance, is found altogether in North and South America, except for two genera in Madagascar and one in the Fiji Islands. Their curious teeth, round at the root and sawlike at the tips, are the distinguishing characteristic. Typically, too, they have a large dewlap or pouch under the head and neck and scaly crest running down the back from the neck to the end of the long slender tail. Most of them are green and live among trees; some have the power of changing their colors apparently at will.

The great Galapagos sea-iguana—four or five feet long or more—spends most of its life in the water. It has slightly webbed feet and feeds on seaweed. The Galapagos land iguana is a stout lazy creature, which feeds on the foliage of trees. The large common iguana of Central and South America—a green tree lizard—is hunted by the natives for its white delicate flesh which resembles chicken. The rhinoceros iguana of San Domingo has two horns on its nose. Even more frightful in aspect, though as harmless as other iguanas, is the helmeted or hooded basilisk of Central America, with its wicked-looking crest on head and back. (*See also* Lizards.)

IRRIGATION PRODUCTS



Here are three examples of the good things the soil of Idaho produces—much of it land that used to be classed in the old geographies as part of the "Great American Desert." It has been transformed by irrigation. Apples, wheat, and potatoes from Idaho are of exceedingly fine quality.

In the HEART *of the* UNION — *the* "PRAIRIE STATE"



Extent.—Greatest length, north to south, 385 miles; east to west, 218 miles. Area, 56,665 square miles. Population (1920 census), 6,485,280.

Physical Features.—Level or rolling prairies, with an offshoot of the Ozark ridge in the extreme south and low hills in the north. Principal rivers: Illinois, Rock, and Kaskaskia, tributaries of the Mississippi; Embarrass and Little Wabash, tributaries of the Wabash. Lake Michigan at northeastern corner.

Principal Products.—Corn, oats, wheat, hay, vegetables; swine, horses, cattle; meat products; foundry and machine-shop products, agricultural implements, railway cars, clothing; coal, petroleum, zinc, limestone and sandstone, portland cement, clay products.

Chief Cities.—Chicago (over 2,700,000), Peoria (77,000), East St. Louis (67,000), Rockford (66,000), Springfield (capital, 60,000), Decatur (45,000), Joliet, Aurora, Quincy, Rock Island, Danville, Elgin, Bloomington (over 25,000).

ILLINOIS. "The center of population, now in Indiana, is traveling straight towards the middle point of Illinois. The center of manufacturing has reached as yet only eastern Ohio, but it is marching in a beeline for Chicago." This, it is said, is the boast of the people of the "Prairie State"; and it is not without foundation. Illinois stands near the middle point of the continent, binding North to South and East to West. Its chief city, Chicago, is the metropolis of the Middle West and the second city in size in the country. Transportation lines from all directions center here, and give Illinois more miles of railway than any other state except Texas.

But if Illinois owes much to its position, it owes no less to its great resources. Three-fifths of its area is underlain with productive deposits of coal, making it third in coal production among the states. The entire state is covered with rich well-watered lands that make it second only to Iowa in corn production, and near the head in wheat, oats, and hay. Not only does it contain the biggest meat-packing center in the world, but it also produces swine, cattle, and sheep in great numbers. The most remarkable feature about Illinois is that while it holds third rank in manufactures, and second or third in mineral production, it has occasionally surpassed all other states in the total value of its agricultural products. Since 1890 it has held first place in the value of its farm lands.

With its gradually sloping hills and broad shallow valleys, Illinois is one of the most level states in the country. The only considerable eminences are about 50 miles from the southern boundary, where a narrow branch of the Ozark Mountains crosses the state. In the northwest the state reaches its greatest height in hills that rise some 1,200 feet above sea-level; but even these are only a few hundred feet above the surrounding country. From north to south the surface of the land as a whole slopes gently to the lowest point, at Cairo, which is only 300 feet above sea-level.

If a relief map of Illinois shows a land of no mountains, it shows one well covered with rivers. On the east the state touches the vast "unsalted seas" of the Great Lakes. On the west and south it borders for hundreds of miles on two of the greatest navigable rivers of the United States—the Mississippi and the Ohio; and on the east, separating it from Indiana, is the Wabash. Nor is the interior less well supplied. There are more than 275 streams in the state, grouped in two river systems. Three-fourths of the streams flow into the Mississippi, while the others are tributary to the Wabash or Ohio rivers. The most important river in the state is the Illinois, which, formed by the junction of the Des Plaines and Kankakee, drains almost half the state. The early French explorer, Father Marquette, wrote of it: "We have seen nothing like this river for the fertility of the land, its prairies, woods, and wild cattle. It has many little lakes and tributary rivers."

All along the Illinois and other rivers of the state are bluffs of considerable height and steepness, the most noted of which is Starved Rock, which rises from the Illinois River opposite Utica. The view of

the countryside from the top of this mammoth rock, 157 feet above the river, and the numerous wooded ravines and canyons extending far up and down the river, is unrivaled in beauty anywhere. The spot is also rich in historic lore. Here the intrepid explorer La Salle built Fort St. Louis as a link in a chain of French fortifications; and here, in after years—if tradition is to be believed—perished the last remnant of the Illinois Indians, driven by their foes to the flat top of the rock, where all but a few died of hunger rather than surrender. The district about Starved Rock has been made a state park. Deer Park Canyon, a few miles away, is another place of great natural beauty and interest.

Other state parks are Fort Massac on the Ohio River, the gateway by which George Rogers Clark entered and conquered the British; and New Salem, the home of Abraham Lincoln, located on the Sangamon River not far north of Springfield. It was here that Lincoln kept store, studied law, and was elected to the legislature. The Rutledge Inn, where he boarded, and courted Ann Rutledge, has been restored, along with other historic buildings. Plans are now under way to restore Fort Chartres, near the Kaskaskia River, which was the center of French influence in the Middle West for more than a century. Cahokia Mound, or Monk's Mound, about six miles from East St. Louis, is one of the most imposing monuments of the prehistoric mound builders in the United States, and attracts many visitors annually.

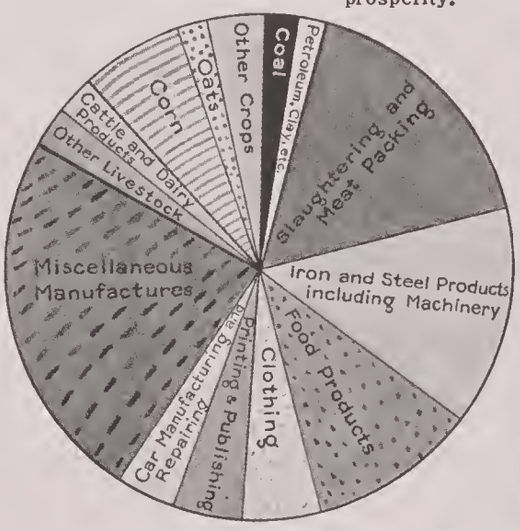
When the early explorers penetrated Illinois the treeless plains resembled billowy seas of tall grass and beautiful flowers. Forests were found only in the southern part and bordering the rivers in the north. Today both forests and prairies have yielded to the plow, and there is nothing to suggest the name that Illinois still holds—the "Prairie State." More than 90 per cent of its land is under cultivation. One may travel for miles and see nothing but ample farms with comfortable farmhouses, and prosperous middle-sized communities.

These level and extremely fertile farming lands are by far the greatest and most enduring source of the state's wealth. The plow may run for miles without touching a pebble or scarcely a grain of sand. The rich black loam is so fertile that in many places rotation of crops is not necessary. The gentle slopes and fine soil have invited the

A STATE CROWDED WITH FERTILE FARMS



Illinois' position at the foot of Lake Michigan, with the Mississippi River for its western boundary, makes the state a natural avenue of commerce. This, added to the richness of its soil, explains its great prosperity.



The circular graph shows the relative value of Illinois products. At the right we see how the population of the state is divided according to religious belief.



PICTURESQUE MEMORIAL OF THE GRIM INDIAN WAR



This is the famous Starved Rock as seen from the Illinois River. From the top of this rock, which stands 157 feet above the river, the eye takes in a charming panorama of wooded ravines and canyons. Looking back into history, we remember that this is the rock on which La Salle built Fort St. Louis and on this level summit gathered the last remnant of the Illinois Indians, fleeing from tne Potawatomies, and here they perished from hunger.

introduction of machinery making large farms possible and enormously increasing the production. In some places the flatness of the land has been a handicap, because of poor drainage. Tile drains and ditches remove this difficulty, and make these lands some of the most valuable in the "corn belt." Only Iowa has a greater proportion of land under cultivation than Illinois.

Climate and soil permit also of the growing of nearly every crop known in the temperate belt. Even cotton and tobacco are grown to a small extent in "Little Egypt," around Cairo, where the state melts invisibly into Kentucky conditions. But by far the most valuable of Illinois' crops is corn, grown chiefly in the north and central parts of the state. With the exception of one year, Illinois ranked first in corn production for 58 years; then, in 1918, Iowa surpassed it. Together Illinois and Iowa produce more than one-fourth of the corn raised in the whole United States. Wheat is grown extensively in the southern part of the state, and hay and oats are abundant in the north, where dairying is consequently well developed. Oats and hay encourage the breeding of horses, of which there are more than a million, while the corn is used to feed hogs and cattle. Vegetables and other garden products are raised extensively near the large cities, and apples and strawberries are grown in every county.

ON AN ILLINOIS STOCK FARM



This picture of a group of Holsteins taken near Quincy is typical of the fine stock farms of Illinois.

Coal and iron, the most important minerals in the world, are both readily available to Illinois. Coal is furnished by its own enormous deposits, which underlie most of the state, and cheap water transportation places the rich Lake Superior iron-ore region within easy reach. Illinois ranks high in the production of petroleum and natural gas, which are found in many parts of the state. Clay, used for brick, tile, and other products, is found in every county, and limestone, clay, and shale are

PRODUCTS OF ILLINOIS FARM LAND





Only one other State —Iowa—has a greater proportion of land under cultivation than Illinois. The upper picture shows a field of grain in the southern part of the state, and in the lower picture you see a group of giants of the corn field. Illinois and Iowa together produce more than one-fourth of the corn raised in the United States.

extensively used in the manufacture of portland cement. Illinois produces more fluor-spar (used chiefly in the smelting of iron) than any other state. It also has some zinc and lead mines in the vicinity of Galena.

Manufactures and industry on an enormous scale are the result of the cheap and plentiful coal, combined with easily accessible iron. Cyrus McCormick established his harvester factory in Illinois, and today there is scarcely a place in the civilized world where you will not find agricultural implements made in Illinois. Meat-packing is the most important single industry. The stockyards and packing establishments of Chicago are, indeed, the greatest in the world; and about this industry and the grain trade, for which also Chicago is a world center, have grown a number of related industries dealing with the preparation and marketing of food products. Just to the south of Chicago, and in many other cities, are important steel mills. The state ranks high also in the manufacture of watches, furniture, musical instruments, soap, and men's clothing.

Because of the importance of agriculture, mining, and manufacturing in the state, Illinois is great in commerce. Its central location, its level surface, and the forced direction of east-and-west railroads around the southern end of Lake Michigan, account for the number of railroads in the state. Illinois also holds the best position among the states for inland water transportation. More than 6,000 vessels arrive at and depart from the great harbor at Chicago every year, a larger number than at any other Great Lakes port. The Mississippi, Ohio, and Wabash rivers furnish more than 800 miles of navigable waters on the borders of the state, and the Illinois River is navigable to La Salle, where it is joined by the Illinois and Michigan Canal, which extends to Chicago. Before the development of railroads this canal was of great importance, but at present it is little used. The Chicago Drainage Canal, however, built primarily to carry away the sewage of Chicago so that the waters of Lake Michigan should not be made unfit for use by the city, is capable of carrying lake boats to Lockport,

HARPER MEMORIAL LIBRARY, UNIVERSITY OF CHICAGO



This is the Harper Memorial Library of the University of Chicago, named in honor of Dr. William Rainey Harper, the remarkable man to whose energy, vision, and organizing ability the success of this great institution of learning is largely due. Like the other buildings in the great quadrangle, it is in the Gothic style and of gray limestone. The nucleus of the Library, a collection of 175,000 volumes carefully selected, was purchased in Berlin soon after the University was organized.

a distance of 36 miles from the lake. Here the canal empties into the Des Plaines River, which flows into the Illinois. The state is now working upon a project to deepen these rivers so that large vessels can ply between Chicago and New Orleans. The plan includes extensive developments in the existing electric power plants along the route.

Almost half the population of Illinois lives in the region about Chicago, the residential suburbs of which stretch northward for many miles along the lake bluffs. Chicago is the fourth city in size in the world, and second to New York in the United States both in size and the value of its manufactures (*see* Chicago).

THE ILLINOIS STATE CAPITOL



This is the building in which the laws of the State of Illinois are enacted—the imposing Capitol in Springfield. It is built in the form of a Greek cross with porticoes of granite. It was begun in 1868 and took twenty years for its completion at a total cost of over $4,000,000. This is the fifth capitol building in the history of the state and the second built in Springfield.

The second city in Illinois is Peoria, situated near the center of the state on an expansion of the Illinois River called Peoria Lake. Surrounded by a rich agricultural region, with excellent transportation by rail and water, Peoria has a great wholesale and retail trade; and its proximity to coal beds makes it the second manufacturing city in the state. Its chief manufactures are corn products (syrup, starch, glucose, breakfast foods, etc.), dressed meats, agricultural implements, and watches. It also trades extensively in fish, caught in the waters of the Illinois.

SOME GREAT ILLINOIS INDUSTRIES



These pictures show some of the industrial enterprises upon which rests the prosperity of Illinois. Add to these the products of the fertile farms and you have the combination which, with its central location and abundant means of transportation by land and water, makes that state one of the richest in the Union.

contained in the Easy Reference Fact-Index at the end of this work

THE GROUNDS OF THE STATE UNIVERSITY



The grounds and buildings of the University of Illinois occupy 610 acres between the cities of Urbana and Champaign. This is now one of the best known universities in the country, and rivals the University of Chicago in the rapidity with which it has developed. It is broad in its scope, comprising colleges of Liberal Arts and Sciences, Engineering, Agriculture, Law, Medicine, Dentistry, Library Science, Music, and a School of Education.

Springfield, the capital of Illinois, is a beautiful city laid out with wide and well-shaded streets, with the public square and courthouse in the center. The State Capitol is one of the finest public buildings in the West. Located in a rich agricultural district, it is an important railroad center from which large shipments of coal, grain, and live stock are sent out. Its chief manufactures are steel and lumber products, flour, shoes, and paving brick.

East St. Louis, situated on the Mississippi River opposite St. Louis, Mo., is connected with that city by great steel bridges. It is the terminus of many railways from north, east, and south, and its industries include packing houses, rolling mills, glass works, and flour mills. Other important cities are Rockford, one of the great furniture-making centers of the United States; Elgin, famous for the manufacture of watches and clocks; Joliet, which contains some of the largest steel plants in the country; and Decatur, Aurora, and Quincy, important manufacturing cities.

No state, except New York and Pennsylvania, spends more money for educational purposes than Illinois. In addition to its many elementary and preparatory schools, at which attendance is compulsory for all children between the years of 7 and 14, the state maintains a state university at Urbana, and five normal schools at Normal, Carbondale, Charleston, DeKalb, and Macomb. The University of Chicago, founded by John D. Rockefeller (*see* Chicago) and Northwestern University, at Evanston, are also well known institutions.

The state government follows the usual American pattern. Its administrative functions, however, were greatly improved in 1917, when various scattered boards and commissions were grouped into nine departments and 100 executive offices abolished.

The first white men to see what is now Illinois were the French explorers and missionaries from Canada. Father Marquette and Louis Joliet visited the region in 1673; and Joliet, La Salle, and Tonti visited it again in 1679. The French called the country "Illinois" after the "Illini" or "Iliniwek" confederacy of Algonquian Indians, who lived about the Illinois River. In 1680 La Salle and Father Hennepin established the first Christian missions there. Kaskaskia, Cahokia, and Fort Chartres, all on the Mississippi River, became important French trading posts.

In 1763, by the Treaty of Paris, the Illinois country passed to Great Britain. When the Revolution came, George Rogers Clark and his intrepid Virginians, in 1778, wrested the region from the British. In 1787 it was organized by the United States Congress as part of the Northwest Territory. In 1809 the separate Territory of Illinois (including parts now included in Wisconsin, Michigan, and Minnesota) was organized. On Dec. 3, 1818, Illinois was admitted as a state with its present boundaries. The last conflict with the Indians, called the Black Hawk War, occurred in 1831–32.

The first state capital was at Kaskaskia, the second at Vandalia. In 1837 the capital was removed to Springfield, where it has since remained. During the Civil War Illinois gave to the nation Abraham Lincoln and U. S. Grant, besides furnishing its full quota of troops in the field. The state also played a prominent part in the Mexican and Spanish-American wars, and responded with enthusiasm when the call to arms came in the World War.

LITTLE TALKS ON GREAT THINGS
by Arthur Mee

IMAGINATION

IS NOT imagination the greatest thing in all the world? Is it not at the very heart of all the great things that men have ever done?

Did imagination not give us America? Far back in the centuries this continent was an idea in the minds of some Viking sea-rovers—it was a piece of imagination. Once again it was an idea in the mind of a boy standing in the harbor at Genoa to watch the ships go out—it was part of the imagination of Columbus. Still again, the idea of a great free republic on a continent almost unknown was an idea in the minds of a hundred people who fled from the tyranny of James Stuart in England—it was part of the imagination of the Mayflower men. So, if we think of it, the whole of today is part of the imagination of yesterday, and tomorrow is the imagination of today.

Think of the men who work in things unseen—the great kings of science who peer into the invisible, who weigh the earth and measure the stars, who ponder over the mystery of life itself until they seem to be almost solving it, when the secret slips away and men still ask where life came from and where it goes and what it means. Will they find it out one day? The little crystal that the chemist makes—will it one day come alive? Will these men give us longer life, or kill disease, or drive back death? So the events of every hour thrill the imagination of whoever is not deaf and dumb and blind.

What are pictures and music and books if they do not stir the imagination within us? We listen to the mighty dramatization of sound that we call Handel's 'Messiah', and feel the power and grandeur of great natural forces. We look on the materialization of a vision that we call Raphael's 'Transfiguration', and we feel stirring within us the spirit of the solemn scene it represents. We read the immortalization of piercing anguish in Mrs. Browning's 'Cry of the Children', and we feel ourselves back in another age, listening to the beating hearts and sobs of little ones whose graves have been green these many years. The old, old story that thrills us as we sit remembering by the fire, the book that stirs the mind and opens up another world of thought to us, the picture on the wall that grips the heart as in a vice—what are they but examples of imagination working in us across the earth and through the years? They carry the mind to far-off places and to other days.

Do we not all understand, when we are reading a great story or a beautiful poem, that we have jumped up behind a genius, as it were, and that he is taking us for a ride on his winged horse, Imagination? And do we not also understand that if we ourselves have not a great imagination in our souls we could never enjoy that magic ride? There are those who cannot read poetry, who see nothing beautiful in Nature. Poor, dreary souls! They have no imagination. Without imagination we lose half the fun and all the truth and all the beauty and all the glory of human life.

Somebody has said that a child takes up a twig and calls it a king, and it is true that the imagination of a child is a supreme and wonderful thing. A child knows better than all the grown-ups in the world that this beautiful and romantic earth is not the real thing, that there is in fact a much more beautiful and much more romantic world all about us if we have eyes to see it and imagination to enter into it.

Poets have the same feeling. Keats said that "pleasure never is at home," and bade us "open wide the mind's cage door," so that imagination might fly away with us to the true world of beauty and delight. Wordsworth spoke of human life as the shades of a prison, and said, in those noble words that will not die:

> Our birth is but a sleep and a forgetting:
> The soul that rises with us, our life's Star,
> Hath had elsewhere its setting,
> And cometh from afar:
> Not in entire forgetfulness,
> And not in utter nakedness,
> But trailing clouds of glory do we come
> From God, who is our home:
> Heaven lies about us in our infancy!

That heaven of the child is the imagination that stirs within him; and for all of us, as we come into this world and move through it in joy and sorrow, the power of imagination to shape our destinies and bring us happiness is infinite beyond all words. He is rich who, knowing little, has a great imagination; he is poor who, knowing much, has none.

IMMIGRATION. The United States is the most important immigrant receiving country in the world. The English made their first successful settlement in America at Jamestown, Va., in 1607, in what was then a wilderness occupied only by Indians. Although several hundred thousand Dutch, Swedish, and German settlers came to America in the 18th century, the great bulk of the immigrants down to 1820 were English-speaking. Thousands of negroes, also, unwilling immigrants, were brought in as slaves.

Shortly after 1820, white immigration began in increasing numbers from other lands in Europe. A potato famine in Ireland in 1846 caused a large migration of Irish to America. Germans came because of religious oppression, hard times, and unsuccessful revolution (in 1848) in Germany. The discovery of gold in California attracted thousands of fortune-seekers. After the Civil War, Swedes, Danes, and Norwegians came, until the total from these countries reached hundreds of thousands annually.

Down to about 1885, immigration was almost entirely from the countries of northwestern Europe. Then an influx from southeastern Europe began. From Italy, Poland, Austria-Hungary, Bulgaria, Greece, Russia, and other eastern countries they came in steadily increasing numbers. Of the 1,200,000 immigrants who entered the United States in the year 1913-14—the last year preceding the World War—296,000 were Italians, 278,000 from the varied peoples of Austria-Hungary, 255,000 from Russia, 85,000 from the Balkan States (including Rumania), 106,000 from the British Isles, and 79,000 Germans. During the World War (1914-18) immigration was checked.

The earlier immigrants came to the United States with no other thought than to make America their home. They were glad to become citizens of the promising new country and to devote their energies to its betterment. But many of the later arrivals came with no desire except to make money and with the expectation of going back to their native land to spend it. Eager to save, they lived wretchedly, disregarded the laws of health, took no steps towards becoming citizens of this country, and did not learn the English tongue. Fortunately, the majority of immigrants have had an ambition to become Americans and in most cases have become good citizens.

Beginning in 1882, the government has passed laws restricting immigration. Criminals, idiots, the insane, epileptics, those suffering from communicable diseases, anarchists, Asiatics, persons likely to become a public charge, and (since 1917) illiterates are excluded. Undesirable aliens may be deported after they have been admitted. After the World War the number of immigrants from each country was limited to a small percentage (three per cent in 1921) of the number of its citizens in the United States in 1910.

IMMIGRANTS ON THE WAY TO THE "PROMISED LAND"



For more than a century the United States has offered refuge to the oppressed and an opportunity to the ambitious people of Europe. Such scenes as that pictured above are in normal times familiar occurrences at many of the great ports. On the eve of the sailing of every great liner bound for America hundreds of immigrants gather on the dock to take passage in the steerage. They are old and young; they have come from the tenements of Naples, bleak marshes in Finland, Hungarian wheat fields, and the "pale" of Moscow; they speak dozens of different languages and dialects; and they represent half a dozen different faiths; nevertheless, they have one great common interest. Each one is coming to America, the "Promised Land." Here he may work in a roaring steel mill, sell fruit on the street corners, or tend long rows of sugar beets, but whatever the task that awaits him, it is the goal of his weary journey, a chance to succeed.

For any subject not found in its alphabetical place see information

A New American—The Story of Mary Antin

A LITTLE girl with bright starry eyes stood at the rail of a great ocean steamer one glorious May morning and watched the shores of the promised land, America, creep nearer and nearer. She was 5,000 miles from her old home in far-away Russia but she was not afraid. Her mother, brother, and two sisters were with her on the ship, and on shore waited her father who had left home three years before to try his fortunes in the New World. And then was not this America, the wonderful land where no one was looked down on because he worked and where even the children of the poor could go to school?

Can you wonder that this little girl was excited when, after six weeks of travel through strange cities and across the ocean, she at last arrived at her new home? And what a strange home it was! After they had got safely by the immigration officers and joined their father, he took them in a rickety cab to the place he had rented in the slums of Boston. On the way he told them not to lean out of the windows and not to point at things, for if they did, people would know that they were "greenhorns" and not Americans.

AMERICANS IN THE MAKING



Here are young children of foreign-born parents, learning the speech and thought of the new home land in that great Americanizing agency, the public school. The eagerness of immigrants to have their children educated is proved by the fact that the percentage of illiteracy among children of foreign born parents is less than that among children of native birth.

Why Maryashe Changed Her Name

To be Americans was the one desire of the whole family. And one of the first things to do to realize this ambition was to take American names. Our little girl had been christened "Maryashe" at home and that would do very well shortened to "Mary." This was a bitter disappointment, for she did so want a strange-sounding American name like the others. For instance, her elder sister, Fetchke, came forth as Frieda and baby Deborah as Dora. But there was one consolation. Here she could use her surname all the time and not on state occasions alone. And so she felt very important to answer to such a dignified title as "Mary Antin."

With their old names the family exchanged their queer old home-made European dresses, which pointed them out as "greenhorns" to the children on the streets, for real American machine-made garments bought in a dazzlingly beautiful palace called a "department store."

The most wonderful thing happened on Mary's second day in her new home. A little girl from across the alley came and offered to take the children to school. Then it really was true that in America any child could get an education! There was no application to be made, no examinations to pass before you could enter, no fees to pay. But as school was almost over for the year their father decided that they had better wait until September to start. When September came their father took them himself. And Mary was no more eager to enter school than her father was to have her secure an education. In his excitement that morning he walked so fast that the children had to run to keep up with him. Finally they stood around the teacher's desk, and Mary's father in a few broken words explained his hopes for his children.

Although Mary was 12 years old she had to start in the first grade, for she knew no English and had never been to school before. But she was so anxious to learn that she advanced rapidly. Only one thing bothered her. That was the little word "the." She had a hard struggle not to say "zee." But she made her tongue stop buzzing when it said "the" and within a week she was advanced to the second grade. Oh, how proud Mary was four months later when her teacher showed her a paper with her name "Mary Antin" printed in it. For the teacher had sent something Mary wrote to a paper that had printed it. And even a little girl born in America might have been proud to write so well.

"Dingy? It's Beautiful!" Thought Mary

All this time Mary was being made into an American. Dingy little Chelsea, where her family now lived, was beautiful to her. The sight of the letter-carrier or the fire-engine made her happy and proud for they were part of her America. But she was happiest when in her second year in school—she was now in the sixth grade—the class began to study the life of Washington. The reader, the arithmetic, the song book, that had been so fascinating before, suddenly became dull books after she found the story of this great man. When she read the story of the cherry tree and of how the boy Washington would

not tell a lie to save himself from punishment, she resolved that she would follow his example. But even if she never, never told a lie she could not compare with George Washington. He was brave, and she was afraid to go out when the snow-balls whizzed. And she could never be the First President of the United States.

There was one cheering thought in all this. Though she never could be as great as George Washington, she was, as one of her books said, a "fellow-citizen." Her father explained to her how he had become a citizen by naturalization and how, because she was his little daughter, she was also a citizen. This was rather a sobering thought. "If I am a Fellow-Citizen," she thought, "then I must act as a Fellow-Citizen should."

When her class stood up to sing 'America' Mary shouted with all her might, and she meant every word of it when she sang:

I love thy rocks and rills,
Thy woods and templed hills!

As they began to prepare a program for Washington's birthday, Mary decided to write a poem. It was hard work, for poetry, you know, is not always easy to write, and Mary frequently had to pick the words she wanted out of the dictionary. Perhaps it wasn't very good poetry, for Mary herself long afterward laughed at it. But when you think that a little girl 13 years old, who had not been in school two years, wrote it, and that it expressed her love for her new home and for its history, it is wonderful. Here are two of the stanzas of it:

He whose courage, will, amazing bravery,
Did free his land from a despot's rule,
From man's greatest evil, almost slavery,
And all that's taught in tyranny's school,
Who gave his land its liberty,
Who was he?

'Twas he who e'er will be our pride,
Immortal Washington,
Who always did in truth confide,
We hail our Washington.

Mary read her poem in her own room at school and then was sent to other rooms to read it. Everyone thought it wonderful that a little girl who had been an American for so short a time could do so well. Somebody suggested that it should be printed and so Mary, without saying a word to her father and mother, took it to a newspaper office. At the first office no one would pay any attention to her. But at the second she had better luck. The editor promised to print it and send her a copy of the paper with it in. He asked her many questions about herself. By and by the paper came.

You can imagine how happy Mary was. And her family were as proud of her as they could be. Her father bought all the papers he could find and gave them to friends. They were all sure that some day Mary would be great. Because of this belief they kept Mary in school.

This was not easy because the family were very poor. Sometimes they had nothing in the house to eat. They moved from one tenement to another in search of a cheaper place, and many times angry landlords threatened to turn them into the street because they could not pay the rent.

Mary helped all she could on Saturdays and in the evenings, but she could not do much for she was not very strong. But while she was going to school, or reading in the library, she was really getting ready to help her family. And finally the day came when she not only could help them live better but also by her book 'The Promised Land', helped other new Americans by telling the story of how she was made into an American.

IMMORTELLE. This odd plant of the composite family owes its name, which means "everlasting," to the fact that its flowers do not change in color or appearance in drying. Although a native of North Africa, Crete, and Asia, it seems rather to belong to southern France, for there, on the ground sloping down to the Mediterranean, it is cultivated in great quantities. It requires light, sandy soil, and is planted in plots surrounded by dry stone walls in positions well exposed to the sun. The flowers, which have dry, scaly, deep yellow bracts, are gathered in June when these bracts are fully developed. All fully expanded and immature blossoms are pulled off and rejected, for to retain their appearance when dried, they must be in just the proper condition. The dried immortelles are woven into wreaths and garlands, to be placed beside graves as emblems of immortality. They are also dyed black, red, or green and used for bouquets and other ornamental purposes. The scientific name of this flower is *Helichrysum orientale.*

The name immortelle is also given to several other plants with dry scaly blossoms. Among them is an Australian plant (*Helichrysum bracteatum*) which has single and double flowers of different colors; and one of the Cape of Good Hope (*Helichrysum vestitum*) which has white satiny heads. The most common American varieties are several species of the cudweed (*Gnaphalium* and *Antennaria*).

IMPEACHMENT. When the framers of the United States Constitution were seeking some means to control men in public office, without depriving them of a reasonable independence, they took over the process of impeachment from the English. The president, vice-president, judges, and all civil officers of the United States are subject to impeachment for causes, which are named in the Constitution as "treason, bribery, or other high crimes and misdemeanors." The House of Representatives by majority vote makes the accusation. The Senate, sitting as a court of impeachment, is the judge of the officer's guilt. Its action is judicial, not legislative, and from its decision there is no appeal. The penalty in case of conviction is simply removal from office and disqualification for further public service. A number of impeachment cases have come before the Senate, one of them that of a president—Andrew Johnson—who was acquitted.

Impeachment is provided for in the constitutions of most of the states also. It has been superseded to some extent by the "recall," which in some states allows the voters to vacate any office before the expiration of the officeholder's term.

IN'CAS. Scattered over the central highlands of the Andes Mountains of South America are found the remains of massive stone temples, palaces, fortresses, terraces, and dwellings, with pottery, textiles, and gold ornaments. These are the only traces so far discovered of the ancient civilization of the mysterious Incas, a race of Peruvian Indians that held sway for 1,200 miles from what is now Chile, north through Peru and Bolivia into Ecuador.

Whether the Incas stood just at the beginnings of civilization, or whether, as some believe, they represent a culture as old as that of Egypt and more advanced than that of their Spanish conquerors, is still disputed. But they certainly left some remarkable monuments. Above the city of Cuzco in Peru, their ancient capital, tower stupendous ramparts made of individual stones of prodigious size. No mortar was used, yet after centuries these stones lie so cunningly fitted to each other that it is impossible to insert the blade of a knife between them. Some are 20 feet high and weigh many tons. Ruins like these occur in many parts of the Andes, together with remains of stone causeways and carefully terraced fields, all telling of a strong and highly gifted race. Rude records were kept by means of a system of variously knotted and colored cords (called *quipu*), but the Incas were ignorant of writing. Later accounts, of doubtful reliability, ascribe to them a remarkable social organization, in which the land was allotted by the state in small holdings, irrigation was extensively practiced, and poverty was unknown. The ancient population was said to be between 8,000,000 and 12,000,000.

IN THE ANCIENT CAPITAL OF THE INCAS



The walls of many of the houses in Cuzco, Peru, capital of the ancient empire of the Incas, are extensions of the remains of the old Inca walls. The stones in the lower half of the buildings in this picture were set by Inca masons, perhaps before Columbus discovered America. The strength of these massive walls testifies to the high skill of the old Indian architects.

The Incas were skilful weavers, and seem to have been proficient in every style of hand weaving we know today. They also knew how to smelt metals and cast in molds; and in the making of pottery they were artists. Evidently, also, they had made some progress in music, for among the remains of their civilization are found flutes made of bone and of cane, clay trumpets and trumpets of shells, bells of different tones, some made of bronze, some of pure copper. They built paved roads, with suspension bridges and post-houses at intervals over the wildest mountain ranges and through the desert for hundreds of miles.

The fall of this thriving and industrious race before Pizarro and his handful of Spaniards forms one of the tragedies of history. The spirit of the race was broken and after a few disastrous rebellions it fell into the submissive apathy which marks the Peruvian Indians of today. Slaughter and oppression, continued through centuries, thinned their numbers until the pure-blooded descendants of the Incas are estimated now to be fewer than 3,000,000. (*See* Peru; Pizarro.)

INCOME TAX. A direct tax greatly used in modern countries, including the United States, as a means for defraying the increasing expenses of government with least hardship to individuals. Usually incomes below a certain amount are exempt and the rate of taxation increases with the amount of income. The income tax became a permanent part of the British fiscal system as early as 1853. In the United States, however, this tax was not adopted until 1913, after an amendment to the constitution had been passed, permitting such a tax to be imposed. (*See* Taxation.)

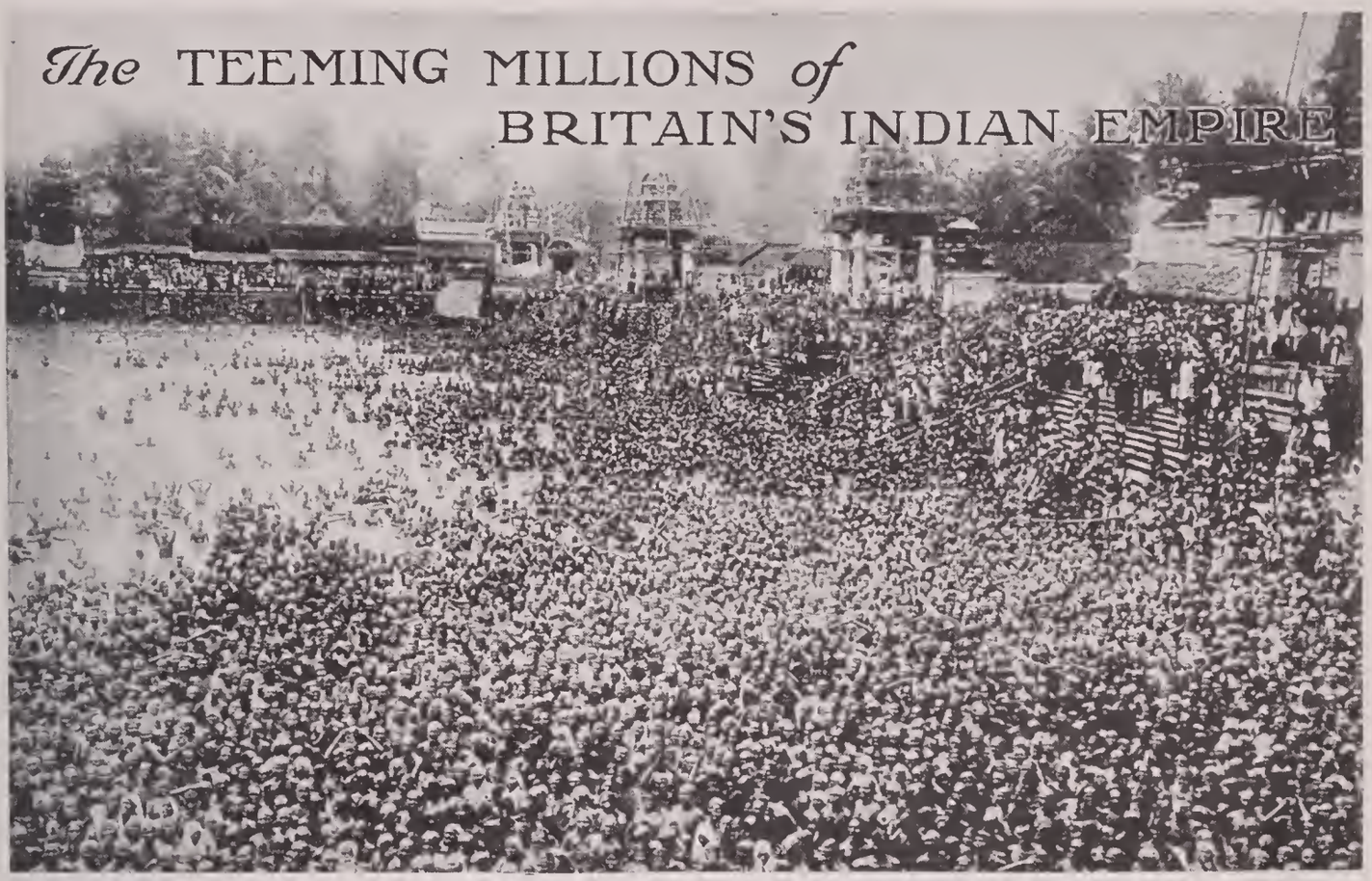
THE DREAM-LIKE "HALL OF THE WINDS"



The Hall of the Winds at Jaipur, India, Sir Edwin Arnold called a "vision of daring and dainty loveliness"; and he goes on to speak of it as "nine stories of rosy masonry [it is finished in pink and white stucco] and delicate overhanging balconies and latticed windows, through the thousand pierced screens and gilded arches of which the Indian air blows cool over the flat roofs of the very highest houses in Jaipur."

For any subject not found in its alphabetical place see information

The TEEMING MILLIONS of BRITAIN'S INDIAN EMPIRE



This picture takes you into the very heart of the story of India. It presents two of the most important aspects of that mysterious land—its crowded population and the powerful influence of its ancient religions. For here we see a dense throng of pilgrims bathing in the Ganges River near the city of Benares. From all parts of India they have come to wash away their sins in the "sacred waters." Back they will go, probably scattering broadcast the germs of plague and cholera. Before the conservatism of the East, Western civilization still stands almost helpless, unable to penetrate the ranks of this vast army of people, unable to teach them the laws of health or sway them from their age-old customs.

INDIA. A land of fascinating and infinite variety is India, which thrusts 1,900 miles downward from the Himalaya Mountains into the Indian Ocean and is inhabited by almost one-fifth of the human race. And what contrasts among these crowded people! They are divided into numerous races and clans; they speak more than 100 distinct languages and dialects; they profess countless shades of religious beliefs; they are split into more than 2,000 social castes; and they are grouped into more than 700 provinces and petty states. Despite their civilization reaching back 5,000 years, more than 90 per cent of these people cannot read or write in any language. Some of the more powerful Indian princes, with their secret stores of gold and silver and precious stones, are among the most wealthy men in the world; yet the average per capita income of the people is about $20 a year. Unbelievable poverty reigns for the most part. Thousands die of starvation almost every year, and thousands more, weakened by hunger, fall victims to the plague.

Extent.—North to south, 1,900 miles; east to west, 2,000 miles. Area, about 1,800,000 square miles. Population, about 315,000,000.
Physical Features.—Himalaya Mountains, the highest in the world (20,000 to 29,000 feet); Vindhya Range and Eastern and Western Ghats, inclosing the Deccan plateau; deserts in Sind and Rajputana. Principal rivers: Indus, Ganges, and Brahmaputra.
Products.—Millet, rice, wheat, barley, oil-seeds, cotton, jute, sugar, indigo, coconuts, tobacco. tea, and opium; cotton and silk manufactures, metal work; coal, gold, and petroleum.
Chief Cities.—Calcutta (1,225,000 population), Bombay (980,000), Madras (520,000), Hyderabad (500,000), and Delhi, the capital (235,000).
History.—Aryan invasion, about 1500 B.C.; rise of Buddhism, 6th century B.C.; Alexander the Great's conquest of the northwest, 327 B.C.; Mohammedan conquest, 1001 A.D.; establishment of Mogul Empire, 1526; English East India Company obtained trading posts at Madras (1639), Bombay (1668), and Calcutta (1696); Battle of Plassey established British supremacy over the French, 1757; expansion of British India, 1774–1856; Indian Mutiny, 1857; British Crown takes over government from East India Company, 1858.

The land itself presents almost as many contrasts as the people. In the north the granite peaks of the Himalayas, the highest mountains in the world, are cloaked in eternal snows (*see* Himalaya Mountains), while in the extreme south Cape Comorin dips its coral-studded foot into warm tropical waters. Between these two extremes are found cool hill regions as well as suffocating jungle lands; barren deserts and also river valleys of unsurpassed fertility.

The Divisions of India

A broad view of the country shows four separate and well-defined regions. The mountain and hill districts of the Himalayan ranges, and the slopes of the Afghanistan and Baluchistan highlands form the northern and northwestern borders. Then come the great river plains of the Indus, the Ganges, and the lower Brahmaputra, forming a broad belt from the head of the Arabian Sea to the head of the

INDIA, THE CROWDED LAND OF CONTRASTS



India, a land of contrasts in people and topography, is here spread out before us. It is shut off from Tibet by the famous "Roof of the World," the Himalayas, with their eternal snows. To the north and west are the slopes of the highlands of Afghanistan and Baluchistan. Then come the great river plains; next the vast tableland known as the Deccan with the giant stepping stones, the Ghats, sloping down to the eastern and western coasts.

Bay of Bengal. Next is the great tableland known as the Deccan, which begins where the Vindhya Mountains and their connecting ranges rise from the Ganges plain and includes the southern half of India; it is bounded by the range of hills known as the Eastern Ghats (literally, "stepping stones") sloping down to the Coromandel Coast, and by the Western Ghats descending to the famous Malabar Coast. On the other side of the Bay of Bengal, but politically a part of India, is Burma, a wild and hilly region south of the Brahmaputra valley and extending far down along the west side of the Malay Peninsula, skirting the possessions of Siam (*see* Burma).

The northernmost portion of India, and one of the most important of the native states is Cashmere (Kashmir), which extends over the first Himalayan ranges, and includes the famous Vale of Cashmere (*see* Cashmere). Beyond the Indus, between Cashmere and Afghanistan, stretches the Northwest Frontier Province—a wild rocky region, which forms a buffer between peaceful India and the untamed Afghan tribes. Here is the approach to the famous Khyber Pass, scene of many bloody encounters. The capital, Peshawar, is an important military post as well as a railway terminus and caravan trading station. Even more wild and unsettled is Baluchistan, immediately to the south, which borders on Persia as well as Afghanistan. Only the northern part, about Quetta and the Bolan Pass, is under direct British rule. Nepal and Bhutan, on the borders of Tibet, are independent mountain states with foreign relations subject to British control. In Nepal is located the tallest mountain in the world, Mount Everest; and here too are the famous fighting men, the Gurkhas, who volunteer in large numbers for service in the British armies.

These mountain states and border districts form a picturesque background for the far more important river plains which make up the second division of the country. Broadly speaking, the plains region extends from the delta of the Indus northeastward to the Himalayan foothills, and down the Ganges valley to the Bay of Bengal. Here is a tract of level cultivation about 2,000 miles long and from 200 to 400 miles broad, without a stone of any kind, scarcely a pebble. The soil is composed of river sand and silt, washed down through countless ages from the slopes of the mountain walls to the north.

The Indus at the west and the Brahmaputra at the east have their sources in Tibet behind the snow peaks of the Himalayas, at no great distance apart; and curving around in opposite directions include in their embrace not only the main Himalayan mountain chain but all that portion of northern India which is properly known as Hindustan. This country, in turn saturated by warm rain, chilled by light frosts and scorched by desert winds, is the cradle of ancient Indian civilization. The Ganges valley is one of the most crowded regions in the world, many extensive districts supporting more than 600 persons to the square mile, all of whom get their living directly from the soil. By way of contrast, Baluchistan has only about six persons to the square mile.

THE POLITICAL PATCHWORK OF INDIA



This map shows how India is divided politically. The regions shown in gray constitute British India proper, where British law holds complete sway. The black portions are the so-called "Native States," where the control of internal affairs is left to a great extent in the hands of hereditary native princes. The states of Nepal and Bhutan are completely independent, save in foreign relations.

In this rich plains region are the Punjab or "Land of the Five Rivers," with the important cities of Lahore, Amritsar, Simla, and Delhi, the capital of all India; Rajputana, a collection of about a score of small native states, with the cities Jaipur, Jodhpur, and Bikanir; the United Provinces of Agra and Oudh, with the famous cities of Allahabad, Cawnpore, Lucknow, Benares the "Holy," Agra, Bareilly, and Meerut; and the Bengal district with Calcutta, the largest city of India, and Patna as the principal places. Eastern Bengal and Assam, which lie beyond the Ganges, are also parts of this division.

A HOME ON THE MOUNTAIN BORDER

Perched like eagles' nests on the steep slopes of the Himalayas, these small native houses are as much forts as dwellings. For this borderland is disturbed by frequent tribal feuds and robber raids. When the householder sees enemies approaching, he barricades his door and urges the foe to move on, with a gun muzzle thrust through one of those loopholes in the wall.



The third division of India, the peninsula known as the Deccan, offers a marked contrast to the northern plains. The hill country begins not far south of Delhi, and spreads fan-wise southeast and southwest; while farther south a series of ranges crosses the peninsula from west to east. The Western Ghats follow the coast closely rising in an unbroken wall to an altitude of 8,000 feet behind the old Portuguese port of Calicut. Close to the coast as they are, the Western Ghats form the true backbone of India, for from their rugged sides the whole country slopes generally eastward; the rivers which rise in their narrow landward gorges flow for the most part clear across the peninsula and empty into the Bay of Bengal. The Eastern Ghats are of no great

IN THE STREETS OF JAIPUR



Isn't this a fine broad street? We are in the city of Jaipur. With its palaces and houses of pink stucco built in delicate ornamented patterns, it suggests a pictured city on the drop curtain of a stage. It is really a busy, prosperous town and quite young, as time goes in ancient India, Jaipur having been founded in 1728 by the Maharaja Jai Singh II. It is the only city in India that is laid out in straight streets and rectangular blocks.

altitude; they average less than 1,000 feet and are broken through in many places by rivers large and small, which cut deep gashes to the sea.

The central Deccan consists principally of rough hills, some covered with dense forests, others with tall jungle grass, and still others swept bare by dry winds. At intervals are broad well-cultivated plateaus, and the banks of the numerous streams are dotted with tiny irrigated farms and cleared pasture lands.

The political divisions of southern India are more confused than are those to the north. The Bombay presidency includes the Sind region and more than 350 small native states. Its chief city is Bombay, the second largest in India. East of the Bombay Presidency lie the native states of the Central India Agency and the Central Provinces under direct British rule. The cities of Gwalior in the north and Nagpur in the south are the most important. Farther south and occupying the very heart of the Deccan are the dominions of the Nizam of Hyderabad, the largest and most populous of the native states.

The Madras Presidency, the largest of the British provinces, begins south of the Bengal district, includes the whole east coast to Cape Comorin, and extends to the west coast, almost completely surrounding the large native state of Mysore (capital, Bangalore), and crowding the states of Cochin and Travancore into the southwest corner. This region, especially the Carnatic, is rich in historic traditions. The city of Madras is the third largest in India; other important places are Madura, Trichinopoly, Calicut, Mysore, Negapatam, and Cuddalore.

"ON HIS MAJESTY'S SERVICE"



Camel riders like this form an important branch of the military service of India. Notice that this man though wearing a uniform wears the native headgear, as do all the native Indian troops.

The Winds of Life

Picture to yourself a typical Indian scene during the months of April and May. The burning and pitiless sun looks down upon a land sapped of its strength. The baked earth seems dead, the dried grass rustles

with the scorching breath of the wind; the very blue of the sky seems to turn brassy in the intolerable white light of noon. Doors and windows are closed to shut out the furnaee blasts, and the population dozes and gasps for air. Birds with beaks open and drooping heads seek sueh shade as they ean find. Gaunt eattle gather under the trees. A deathly silenee reigns.

Presently a dust-storm advanees. Behind this rise great black clouds, rolling forward like a tidal wave. The storm bursts overhead with a roar and the water strikes the ground in sheets. The great *monsoon* has eome, the annual southwest wind whieh brings life-giving rains to northern India. Within a week the bleak country has beeome again a mass of green.

The monsoons are the salvation of the millions in India who live on the fruits of the soil. There are two of these winds, the "great" or *southwest* monsoon, which blows from June to October; and the "lesser" or *northeast* monsoon, whieh blows during November and Deeember. (*See* Winds.) The mountainous wall of the Western Ghats causes the more southerly eurrents to release most of their moisture on the west coast. The winds which enter over the Sind eoast do not strike a cooling mountain range until they have erossed the Sind deserts and most of Rajputana, so that they earry a great part of their moisture far into the Punjab, or sweep eastward along the Himalayan barrier, shedding their rain through the United Provinces and Bengal. In eastern Bengal these winds meet the monsoon eoming up the Bay of Bengal, and the two together sweep onward until they strike the Assam hills, where they drop their double eharge of moisture. This explains why Assam has the largest rainfall of any region on earth, 50 or 60 feet a year being not unusual in the Cherra Punji distriet (50 *inches* is above the average in the United States).

LIKE A BIRD IN A CAGE



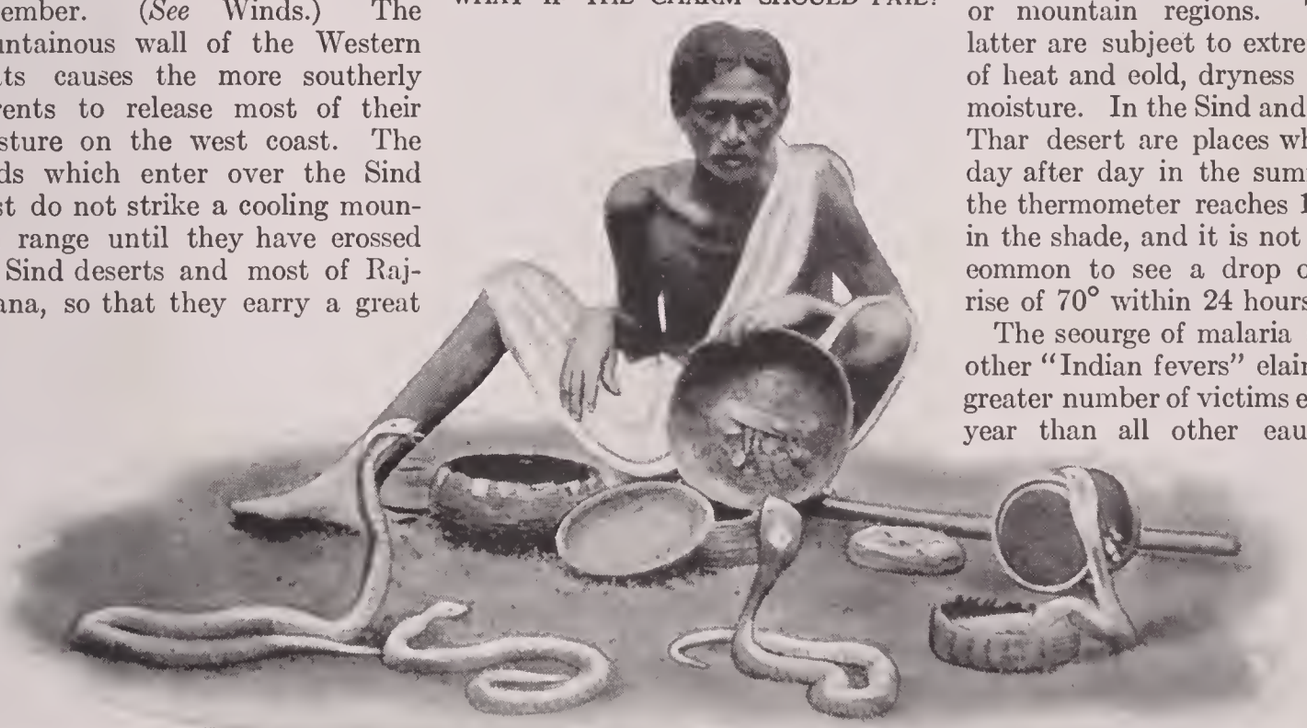
While wealthy Indian princesses travel in jeweled palanquins, veiled with silken curtains, the poor uphold their ideas of propriety with such crude affairs as this. The young lady here could probably travel much faster on her feet, but that would be a social "faux pas."

As the land eools under the influence of the rains, the *southwest* monsoon blows itself out in Oetober, and in November the *northeast* monsoon sets in. This earries rain to the east and southeast and to the eentral plateau of the Deeean, whieh, as we have seen, are deprived of their due share of the earlier moisture by the barrier of the Western Ghats. A good monsoon season means plenty of food for India, a bad monsoon season means starvation, misery, and death for thousands of helpless victims.

In general southern India enjoys a more equable elimate than the river plains or mountain regions. The latter are subjeet to extremes of heat and eold, dryness and moisture. In the Sind and the Thar desert are places where day after day in the summer the thermometer reaches 110° in the shade, and it is not uneommon to see a drop or a rise of 70° within 24 hours.

The seourge of malaria and other "Indian fevers" elaim a greater number of victims eaeh year than all other eauses, including even eholera and plague. Europeans during the hottest weather usually seek the high altitudes of Simla, Cashmere, and elsewhere.

WHAT IF THE CHARM SHOULD FAIL?



Four deadly cobras have crawled out of their baskets, as the Indian Snake Charmer hums his low rhythmic song. Three of them have reared their heads, expanding their "hoods" while they sway in time to the music. The secret of the "charm" is not thoroughly understood, but it is believed to be a form of hypnotism. Sometimes it fails and the Snake Charmer is bitten and dies.

The Himalayan climate is favorable to a tremendous variety of plant life. Below the snow line are found vast fields of rhododendrons, then thick forests of evergreens, and on the damp lower slopes to the east a rank and tangled undergrowth of coarse grass, bushes, canebrakes, bamboo, and great trees, whose branches are thick with orchids. The plains region is notable for the *babul*, a species of acacia, the mango, the banyan, the plantain, and the betel-palm. The northern Deccan forests consist chiefly of scrub trees, but in the south teak, sandalwood, and satinwood flourish abundantly.

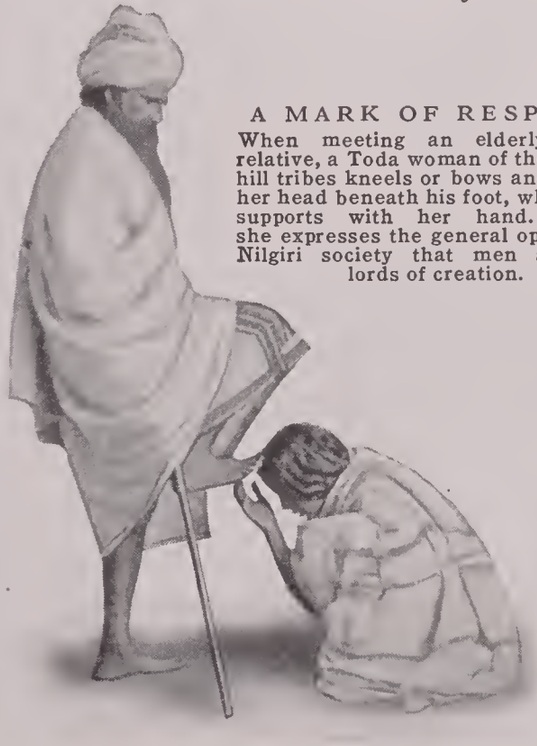
Wild animals abound all over India, for religion forbids the majority of the people to kill any living creature. The tiger is found in all the wilder forest regions, and is responsible for about 500 deaths a year throughout the empire. Lions, once plentiful in Hindustan, are now confined to the Kathiawar peninsula between the Gulf of Cutch and the Gulf of Cambay. Bears are numerous in the mountains and leopards infest many of the more remote tracts. Elephants still exist in the primeval forests of the southwest, but the ranks of the domestic elephants are mainly recruited in the hills of Assam and Burma, where dwells also the rhinoceros. The *gaur* or Indian bison, the wild buffalo, and the wild pig offer exciting sport to the hunter in many parts of the land. The wolf, the jackal, the wild dog or *dhole*, and the striped hyena are plentiful. Monkeys are numerous near settlements and do great damage to crops. The larger rivers are filled with crocodiles; and snakes abound in all districts, the cobra and the krait being the most dangerous and causing thousands of deaths annually. Insects are incredibly numerous. A few, such as the bee, the silkworm, and the lac-insect, are useful, but by far the greater number are exceedingly harmful or annoying pests.

THE UNTAMED AFGHANS



These two chiefs belong to the border tribes of Afghanistan. These tribes are composed for the most part of haughty and fierce barbarians, ever ready to fight for their independence or simply to "fight for fun."

The population of India may be roughly placed in five groups: (1) The descendants of the earliest known inhabitants of India, sometimes called Dravidians, who are represented by the savage Bhils and Gonds of central and western India, and by the Tamils of the south. (2) The pure-blood descendants of the successive tides of Aryan invaders who came in through the northwestern passes and conquered the Dravidian inhabitants, and who are best represented by the Rajputs. (3) The great mass of Hindus formed by a mixture of the two preceding types. (4) The descendants of the Mohammedan invaders who began pouring in in the 7th century. (5) The Mongol or Tibetan types, which are found chiefly in the extreme northeast and in the Himalayan border regions.



A MARK OF RESPECT

When meeting an elderly male relative, a Toda woman of the Nilgiri hill tribes kneels or bows and places her head beneath his foot, which she supports with her hand. Thus she expresses the general opinion of Nilgiri society that men are the lords of creation.

The people of Dravidian stock are short, dark, with curly or wavy hair and broad noses. At the other extreme are the Rajputs, tall, slender, and handsome. Most Hindus range between these two types.

The many separate languages of India can be generally divided into those derived from the ancient Sanskrit and those from the early Dravidian tongues, with a mixture of Malay and Chinese elements. In northern India the interstate and intertribal dialect is Hindustani or Urdu, a blend of Persian with the dominant "Hindi" language.

But it is not so much linguistic or racial differences which divide the people of India as differences of religion. The chief of these are Hindu, Mohammedan, Buddhist, Sikh, Jain, Christian, and Parsee.

Next to the crude animistic beliefs of the primitive hill peoples, who see gods in rocks and trees, Hinduism is the oldest religion, and includes in its numerous sects more than 200 million persons. Hinduism has many forms, all marked by a belief in many gods, in

For any subject not found in its alphabetical place see information

THE GIANT BULL OF SIVA WITH THE HAUGHTY AIR



This immense figure carved from stone stands near the city of Mysore. See that look of calm disdain on his face, while the two Hindus kneel before him in prayer! That's because he is a representative of the god Siva, and because under that great left hoof rests the fate of many a poor worshiper, or at least so they believe.

universal reincarnation, and by accepting the supremacy of the Brahmans and the restrictions of the caste system (*see* Hinduism). The Sikhs form a religious community, centering in the Punjab, whose history dates back to the 16th century. Their faith is a curious mixture of Mohammedanism and Hinduism, and for a time they constituted a military brotherhood of formidable power. Today they number little more than three millions. The Jains, on the other hand, tend to combine the Buddhist and Hindu religions. There are today about 1,250,000 Jains, scattered through Hindustan and westward in Gujarat, and among them are many of the richest and most influential of Indian merchants. Their temples, among which are the famous ones on Mount Abu, are the finest in all India. The Parsees are descendants of Persian Zoroastrians—fire and sun worshipers who fled to India to escape the Mohammedan massacres of the 7th century. Centering about Bombay, they form now a rich merchant class of great power, despite the fact that their total number is only 100,000.

THE STONE BULL'S LIVING BROTHER



Indian cattle are peculiar for the fleshy hump on their backs and the great fold of skin under their necks. While very humble looking, compared to Siva's stone bull above, they nevertheless receive a big share of Hindu reverence.

The native Christians of India total about four millions, with the Roman Catholics far in the lead. The Mohammedans, with about 65 millions, form the largest religious group next to the followers of Hinduism (*see* Mohammed). The Buddhists, once exceedingly powerful in the land, have virtually disappeared from India proper; of the 10,000,000 counted in the empire today, all but about 100,000 are found in Burma (*see* Buddha).

A CURIOUS WAY TO CURE THE TOOTHACHE

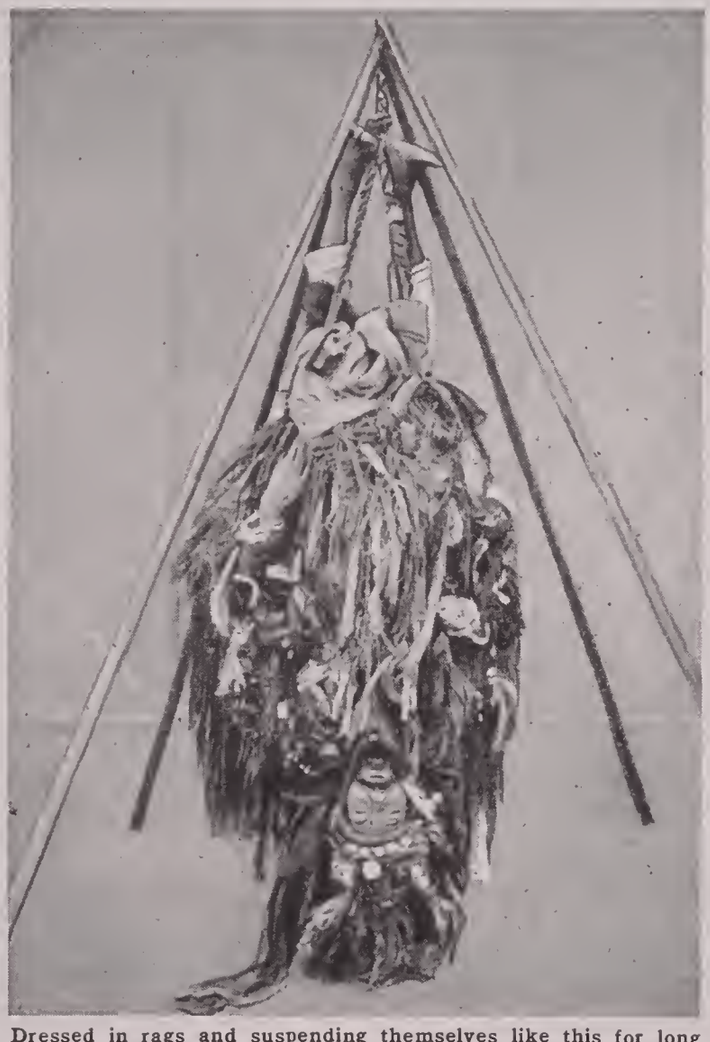


If you were a native boy of India and got the toothache, your parents might first call a native doctor; then, if you didn't get better, a soothsayer, who would call in the devil dancers, and the devil dancers would bring with them the tom-tom players, such as those in the picture, to beat time while they propitiated the "Toothache Devil." The dancers would first put on masks representing the way one looks when he has the toothache and later masks showing the face of a mild inoffensive person, to represent the Toothache Devil in a good humor; as much as to say to him in sign language, "We know you are causing this trouble, but after all you are a decent fellow, and kindly don't hurt this little boy any more." Curiously enough these ceremonies usually have a favorable effect on the patient—just because he thinks they will, no doubt.

The followers of Hinduism, which means at least two-thirds of the population, are grouped into countless castes which are half social, half religious. The caste system had its foundation in the old Aryan law, which divided the people into four classes — the priests or Brahmans, the warriors or Kshatriyas, the farmers or Vaisyas, and the laborers or Sudras. The latter consisted of the conquered non-Aryan peoples.

Today these four original castes have been subdivided again and again until it is impossible to tell the number. Estimates vary between 2,000 and 3,000 distinct groups. The divisions are made upon a basis of race, geographical situation, and occupation. Thus five classes or "nations" of Brahmans dwell south of the Vindhya Mountains and five to the north; and these ten are in turn split in no less than 1,886 tribes.

AN UPTURNED SAINT



Dressed in rags and suspending themselves like this for long periods of time, the "Saints with the Upturned Face" get a great reputation for sanctity. They are only one of the many classes of "fakirs" or holy men among the Hindus who inflict painful penances upon themselves.

The members of each handicraft, such as potters, jewelers, etc., tend to form separate castes which amount to trade gilds or unions.

The restrictions which surround members of a caste are innumerable. Generally speaking a person may not marry outside his caste, nor may he touch or associate with a member of a lower caste. Certain of the high-caste Hindus feel that they are profaned if even the shadow of a European or of the member of a lower caste falls upon them or their food or anything which belongs to them, and that they must thereupon perform elaborate rites of purification.

Lower yet than the Sudras are the Pariahs or outcasts — a mass of 53,000,000 people, one-sixth of all the population of India. These "untouchables" are prohibited the use of public roads, bridges, and temples. They are forced to

live outside the villages and are allowed to enter only such despised occupations as street-sweeping and leather-working. So defiling is their touch that most Hindus would rather die than accept their help, and they are not even allowed to draw water from the public well.

The average Hindu is a peaceful, patient person. "Life in India," says one writer, "is regarded in a very serious spirit by which even the children are subdued. You will never see them romping at play, and their games are of the quietest description. They take no pleasure whatever in teasing animals, and the birds and beasts of the household are extraordinarily tame. They are not so much petted as treated with the consideration due to members of the family; the cultivator appeals to his bullocks as 'my brothers.' To adults life offers few pleasures. Eating is a monotonous experience of the plainest dishes. Drinking, for the respectable, is limited to water. There are no attractions in sport or in physical exercises. Fairs and festivals give some excitement to the women who can attend them; but the men derive their pleasure rather from the gratification of a sense of dignity and importance than from the exercise of the functions of mind or body."

The position of Indian women is not enviable. They are usually not permitted to learn to read and write, but are closely confined to their homes, where they perform all the menial tasks. They are not even permitted to sit down to meals with their husbands, but must serve them in silence and take what they leave. In spite of legislation, infant and child marriages are common. Although the practice of *suttee*, which allowed a Hindu widow to burn herself on the pyre of her husband, has been stamped out, the lot of a widow is pitiable. She must keep her head shaved, give away all her jewels, and usually spend the rest of her life performing the most menial labor for the family of the dead husband.

The caravans which slowly tread their way through the passes of Afghanistan are following one of the oldest trade routes in the world. At the dawn of history India was already famous for its wealth, its gold and silver and precious stones, its fine silks, its spices and drugs and rare woods. Treasures from India reached the ancient courts of Assyria and Egypt.

Today India's wealth is not reckoned in gold or precious stones, but in the products of the fields. Agriculture is the most important industry, 225,000,000 of the population, out of a total of 315,000,000, making their living by farming, forestry, and stock-raising. And with the increased development of irrigation and transportation facilities, the industry is growing rapidly.

The millet grains form the chief crop, for these hardy, drouth-resisting, and prolific cereals are the staple food of the lower classes. Almost the entire crop is consumed at home. Next in importance are rice, wheat, and pulses (lentils, chick-peas, pigeon-peas, etc.). Oil-seeds and oil-producing plants, such as linseed, rape, mustard, sesamum, groundnuts, castor plants, etc., are extensively grown, for the natives use vast quantities of oil for cooking, for their primitive lamps, and for anointing themselves, and many of these oils are exported. Cotton is one of India's most valuable products (*see* Cotton). Other crops of importance are barley, jute, sugar cane, indigo, tea, coconuts, tobacco, and poppies for the production of opium.

It is estimated that there are more cattle in India than in any other part of the world, but they are a hump-backed species of

WHERE DANCING IS A RELIGION



This is one of the "Nautch" dancers connected with the temples in India, who are known as servants of the gods, because they dance and sing before the idols. They also dance at banquets, marriages, and public entertainments. Notice the jewel the girl wears in her right nostril.

WATER CARRIERS



In many regions where water is scarce, it is carried from house to house in sheepskins and sold to the housewives. The water carriers form one of the lowest castes.

inferior quality, and since the religion of the great majority of Hindus forbids eating beef, the animals are used chiefly for draft purposes. Half-tamed buffaloes are also used in many sections for farm labor, and in the northwest camels are the principal work animals.

ONE OF THE RAJPUTS



This is a Rajput, a member of the fighting and ruling caste of India. The Rajputs are usually of fine appearance, and exceedingly proud of their ancestry. They make some of the finest soldiers in the Indian army.

Among the most important manufacturing establishments of India are cotton mills, jute mills, and sugar mills. Coal, gold, and petroleum are the leading mineral products. Railway development has proceeded further in India than in any other part of Asia. About 40,000 miles are now in operation, consisting of broad gauge trunk lines connecting the large centers of population, and a network of narrow gauge lines. The rivers and canals carry much inland traffic.

The currency of India is based upon the rupee, a silver coin worth about 32 cents. The lesser coins rank as follows: 12 pies make one anna and 16 annas make one rupee. The native custom is to call 100,000 rupees a lakh, and 100 lakhs are called a crore.

India's Tangled History

The early history of India is mostly lost in the mists of ancient traditions. The great Hindu epic poem 'Rig-Veda', written about 1500 B.C., tells of the old struggle between the Aryan invaders and the "black people" who were in possession of the soil. By the 6th century B.C., 16 Aryan states had been established south of the Himalayas, and Brahmanism was flourishing. In 327 B.C. the armies of Alexander the Great reached the Hydaspes River (the modern Jhelam in the Punjab) and the Greek settlements he left behind made a profound impression upon the art and literature of the country. The next 13 centuries were marked by a succession of bitter struggles for power between Indian princes, and by a succession of invasions, among which stand out the inroads of the White Huns in the 5th and 6th centuries A.D. The first attacks of the Mohammedans were repelled, but in the 11th century the Turkish leader Mahmud established the Ghazni dynasty in the land. The Mongol invasion of Genghis Khan followed in 1219 and in 1397 Tamerlane's Tatar hordes poured into India (*see* Mongols). In 1526, Baber, who was a descendant of Genghis Khan as well as Tamerlane, came through the northwest passes from Afghanistan and seized the throne at Delhi, establishing the great Mogul empire which remained intact until the close of the 18th century. The south of India was never completely conquered, but the empire of the north, under such rulers as Akbar and Shah Jehan, was perhaps the most brilliant in the history of the Orient. During the reign of Aurungzebe (1618–1707), the last of the "Great Moguls," arose the power of the Mahrattas in the south, which so undermined the Mogul rule that its last years present a picture of weakness and decay.

A BRAHMAN AND HIS BEADS



The Brahmans form the priestly caste. This one wears a coat and head-dress of holy beads, and carries his "caste mark" on his forehead. Ranking even above the Rajputs, the Brahmans guard their privileges jealously.

AMONG INDIA'S BEST CITIZENS



These two Bombay merchants are Parsees, descendants of Persian "fire worshipers" who fled to India in the 7th century. The Parsees, who hold themselves aloof from the Hindus, are among the most respected and prosperous people of the land.

Meanwhile the struggle between Europeans for supremacy in Indian affairs had begun. With Vasco da Gama's discovery of the ocean route around the Cape of Good Hope in 1498 there began a race for the rich Indian trade between Portugal, Holland, and France. In 1600 the English East India Company joined in the rivalry, and soon had trading posts at Madras, Bombay, and Calcutta



INDIAN ART

On the left is the famous carved gate at Bhilsa. It dates back many centuries before the Christian Era, and is considered one of the finest specimens of Buddhist art. This gateway stands at one of the four entrances of the Sanchi Tope, the oldest historical ruin in India. The second picture shows the carved pillars in a temple at Delhi. Such elaborate carving is typical of Hindu art.



(then called Fort William). The history of India from that time forward deals chiefly with the long commercial struggles of these European rivals. The French, under the leadership of a brilliant governor, Joseph Dupleix, enlisted and drilled native troops and with these interfered so successfully in native quarrels that by 1751 the Carnatic and the Deccan were under French influence.

Just as British influence was threatened with extinction in India, the genius of Robert Clive turned the tables. First his storm and successful holding of Arcot in 1751 and then his victory at Plassey in 1757 overthrew the French power and laid the foundations of the rule of the English East India Company (*see* Clive, Robert). Later mere trading rights gradually grew into political rule. It was one of the strangest conquests in history, this by which a private trading company conquered an empire by the use chiefly of soldiers (Sepoys) raised in that land itself.

Warren Hastings, who became governor-general for the East India Company in 1774, built soundly upon the foundation Clive had laid. He subdued the Mahratta princes and crushed the famous Hyder Ali, sultan of Mysore (*see* Hastings, Warren). In the next 30 years the rule of the British Company extended over a great part of India. Between 1848 and 1856 the Sikhs were defeated and the Punjab was annexed.

But certain high-handed methods employed by the British Company, together with the teachings of missionaries and the advance of European customs, had stirred a great wave of unrest. In 1857 a rumor was circulated among the native troops enlisted under the British flag that the cartridge papers, which the soldiers must tear with their teeth, were greased with the fat of cows and pigs—the former held sacred by the Hindus, and the latter abhorred by the Mohammedans. This rumor set fire to the tinder of discontent, and the great Indian Mutiny of 1857 was the result. The insurrection spread rapidly in the north. Nana Sahib, a Mahratta prince, besieged a British force in Cawnpore, and, after promising safe-conduct, treacherously massacred his prisoners, including women and children. Another British force was besieged in Lucknow, but after the commander, Sir Henry Lawrence, and many others had been killed, the survivors were rescued. Not until Delhi was captured in September, was the mutiny broken.



The great Pagoda at Tanjore, in the Province of Madras, is 200 feet high and is one of the most striking examples of temple architecture in India. Thousands of sculptured figures cover its walls.

A TOMB AS BEAUTIFUL AS A JEWELED CROWN



The tomb of Itimad-ud-daula at Agra is one of the most magnificent pieces of architecture in the world. It was built in 1628 by Nu Jehan for her father, who was a Persian refugee. The whole of the exterior is of glistening white marble, carved and inlaid with delicate designs. Raised upon a decorated platform in the midst of a beautiful garden, it overlooks the city of Agra—a reminder of India's great past.

This tragic outbreak put an end to the political rule of "John Company." In 1858 its rights of government were transferred to the British government and the last flames of the mutiny were quenched. Since then greater respect has been shown to the religious and other susceptibilities of the people, and about two-fifths of India is still left to be ruled by its native princes.

The remaining history of India is the history of rapid industrial and commercial development, enlivened by occasional border warfare, particularly on the Afghanistan frontier. The specters of famine and plague constantly hang over the land. The educated Indians, particularly the Hindus, have demanded an increasing share of self-government.

At the outset of the World War, Germany counted upon a repetition of the Indian mutiny to cripple Great Britain's fighting strength, and secret emissaries of the Berlin government agitated among the Mohammedans, urging them to join hands with their Turkish co-religionists in a holy war upon the British. But these schemes failed, and India contributed a generous share toward the cause of the Allies, not only in money but in fighting men. At the close of the war, however, unrest spread throughout the country and culminated in strikes and riots in many of the larger cities. The "Amritsar massacre" in which about 500 natives were killed by the troops was the most lamentable of these disturbances. It was due to the panic and hot-headedness of the general in charge, who was later removed and punished by the British government.

British India, which comprises about three-fifths of the total area of India and more than three-fourths of its inhabitants, is administered in England by a Secretary of State for India. The executive authority in India is in the hands of a governor-general or viceroy, appointed by the British government. He is assisted by an executive council in India consisting of the heads of the various departments of government. The Indian legislature—composed in part of native Indians—consists of two chambers, the Council of State and the Legislative Assembly. It enacts laws governing all persons in the British provinces and all British subjects within native states.

Each of the 15 British provinces has its own governor, nominated by the viceroy. By an act of the British Parliament passed in 1919, eight of the provinces were granted a considerable measure of self-government. Legislative councils containing at least 70 per cent of elected members were set up, bearing a relation to the Indian legislature similar to that between the provincial and Dominion legislatures in Canada.

The native states, about 700 in number, are governed by their own princes, ministers, or councils, under the advice of a British Resident assigned by the viceroy. Some are required to pay an annual tribute. They are restrained from making war or entering into alliances with one another or with foreign powers. The size of their armies is restricted, and in case of gross misrule the British government reserves the right to interfere. But in most other matters the princes have supreme authority.

LIKE A CLUSTER OF PEARLS ON A CRYSTAL MIRROR



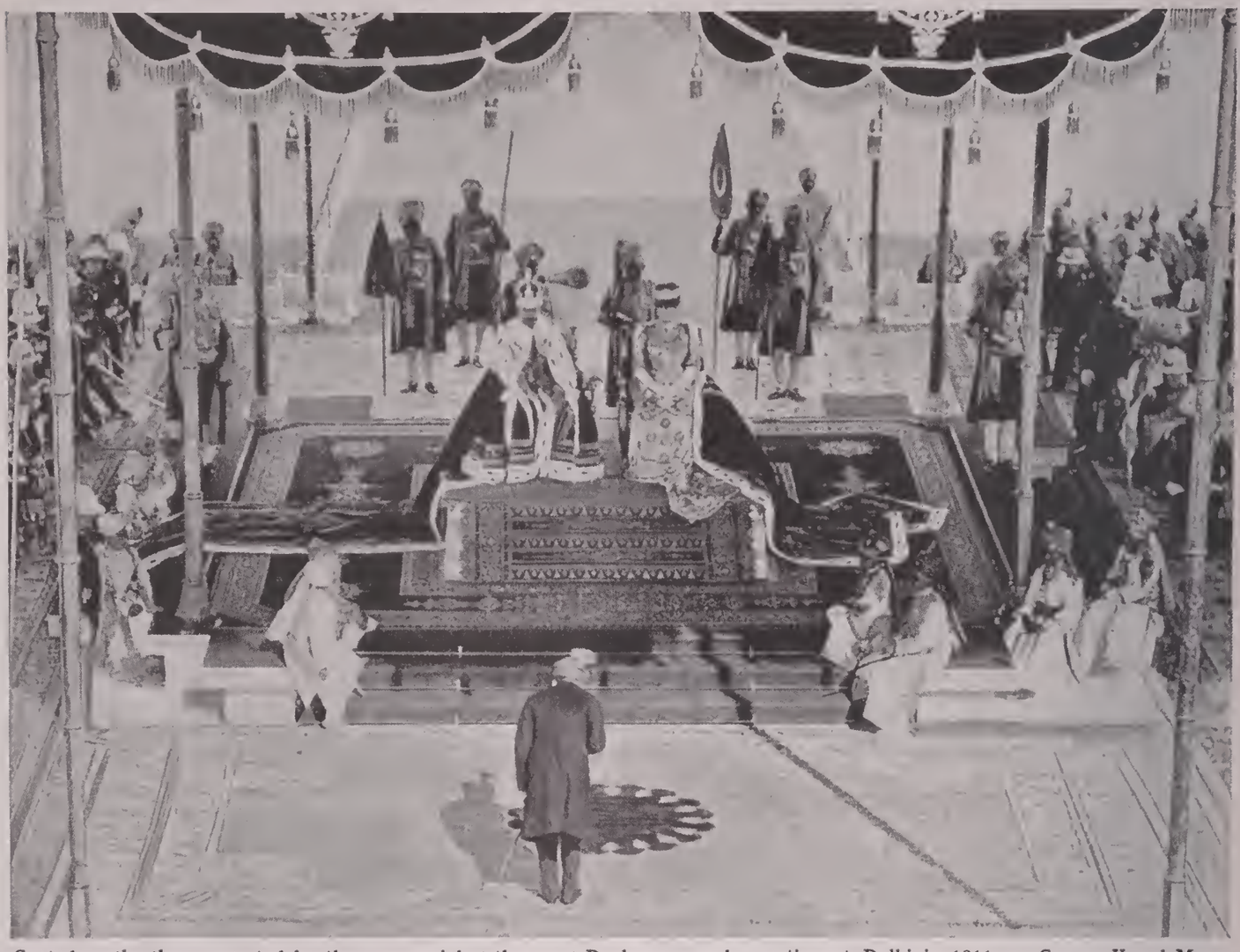
This is one of two beautiful palaces erected on islands in Lake Pichola in the native state of Udaipur. The island is completely inclosed within the marble walls of the palace. It is four acres in extent and, besides the palace buildings, contains three gardens divided from one another by arcaded cloisters in which grow oranges and other tropical fruits.

Architecture is the chief art of India and it has always been distinguished by the same highly decorative style which gives such unique beauty to Indian metal work, jewelry, pottery, and textile patterns. Because most of the early Hindu buildings were of wood and clay, India contains no such relics of ancient architecture as have been left to us in Egypt and Greece, and indeed it is doubtful whether the early Brahman faith encouraged the building of temples. But with the advent of Buddhism and Jainism, monasteries and shrines sprang up over the land. When to these early styles Mohammedan influences were added from the 11th century onward, India developed a varied art of building which gave to the world some of the most beautiful structures in existence. The distinctive feature of Indian architecture is the delicacy and elaborateness of its detail. Some of the temples are covered with mazes of carved figures in unbelievable profusion. Many of the shrines are cut out bodily from the rock, such as the famous underground temples on the island of Elephanta in Bombay harbor. For sheer elegance and grace nothing can compare, however, to the buildings put up by the Great Moguls, such as the world famous Taj Mahal (*see* Taj Mahal), and those erected by their Rajput rivals, including the noted palaces built on the islands of Lake Pichola in Udaipur.

Hindu painting, occupied as it has always been with a grotesque religious imagery, makes no profound appeal to Western eyes. Sculpture suffers from the same fault, and while many of the "pagan gods" are impressive by their size and ornamentation, they cannot be called truly artistic. Much more fascinating is the work of the Indian craftsmen, such as the enameling done by the Sikhs and the damasceening of metal objects in gold and silver wire, which is practiced in Cashmere, in the Punjab, and in the state of Hyderabad.

The earliest Hindu literature consists of the Vedic hymns, of which the 'Rig-Veda' is the most ancient collection. This consists of 1,017 short poems, mostly addressed to the gods, but giving a definite picture of a high civilization existing about the time the Aryan invaders had reached the banks of the Indus and were fighting the "dark people" to the south. To the Vedic poems were attached prose works called 'Brahmanas', explaining the duties of the priests; then were added the 'Sutras', telling of laws and ceremonies; and later the 'Upanishads', treating of God and the soul; the 'Aranyakas', giving directions for leading a holy life; and finally the 'Puranas' or sacred traditions. The two most famous historical poems are the 'Mahabharata' or chronicles of the Delhi kings, and the 'Ramayana' or story of the Aryan advance into southern India. During the period from the 1st to the 8th century A.D. were composed a number of Sanskrit epics and dramas filled with adventure and romance. The old Hindu fables

THE NIZAM OF HYDERABAD PAYING HOMAGE



Seated on the throne erected for the ceremonial at the great Durbar or royal reception at Delhi in 1911 are George V and Mary, King and Queen of Great Britain and Emperor and Empress of India. A part of the impressive ceremonies was the acknowledgment of the sovereignty of Great Britain over India by the rulers of the native states, who in succession passed before their Majesties and paid them formal homage, as the Nizam of Hyderabad is doing here. As the leader among the native rulers, the Nizam of Hyderabad was the first to perform this ceremony.

of animals, which were translated into the Persian as early as the 6th century A.D. and so found their way into Europe, are said to be the basis for many of the familiar nursery stories of England and America.

Under the influence of modern education many Hindu writers are developing a new and interesting national literature. Most conspicuous among these is Rabindranath Tagore (1861–) who has attempted to embody in his poems, tales, parables, and dramas the advanced ideas of European civilization, while keeping the best traditions of ancient Hindu idealism. In 1913 he was awarded the Nobel prize for literature, and in 1915 he received the honor of knighthood at the hands of the British crown. Among his best known works are 'The Crescent Moon: Child Poems', 'The Gardener', and 'Sadhana: The Realization of Life'.

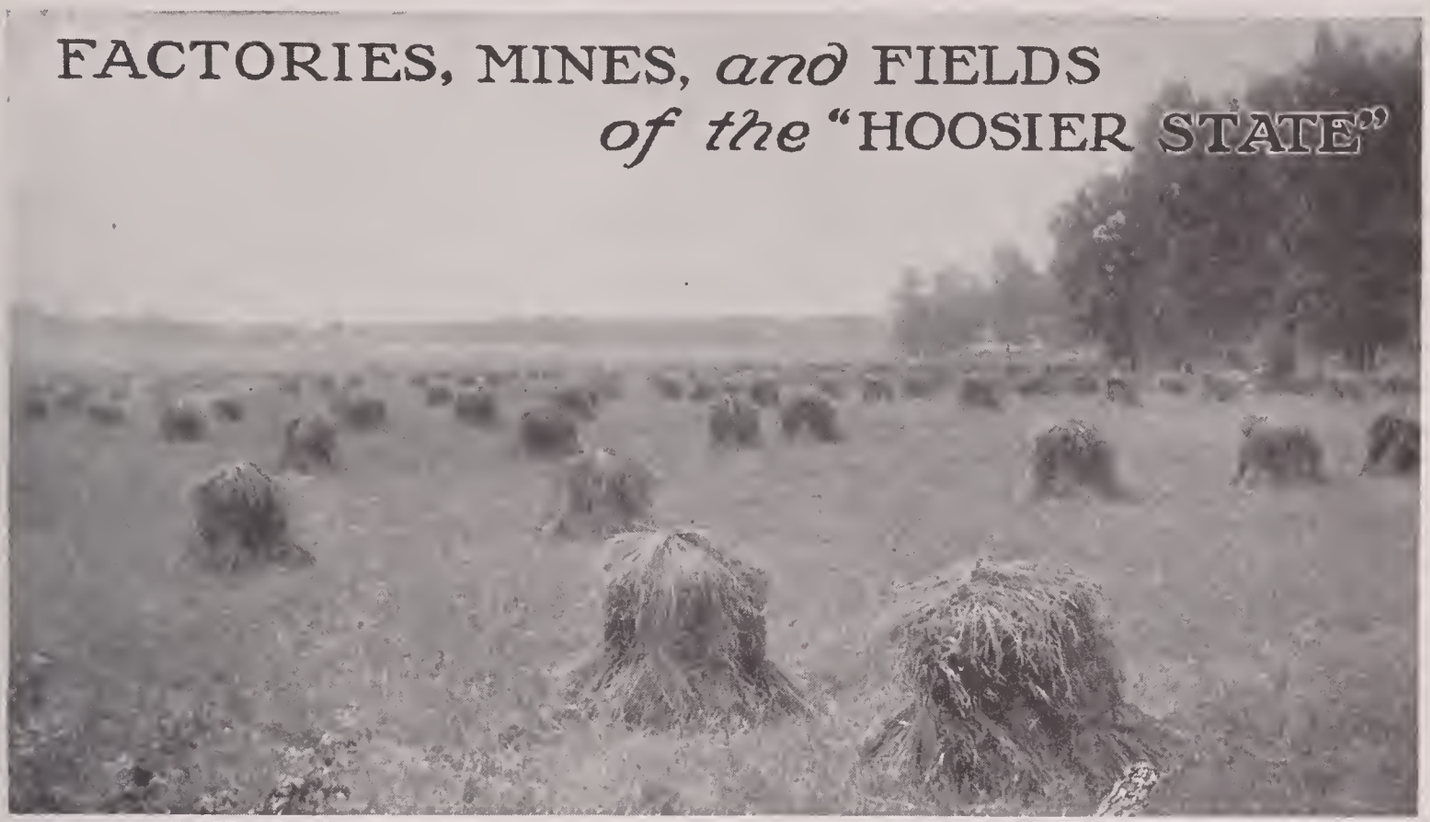
There is in India, also, a great revival of interest in science. Centuries ago Hindu astronomers and mathematicians were highly honored and contributed an important share to the development of knowledge. They exchanged ideas with the Greeks at the time of Alexander's conquest, and in the 9th century important Hindu scientific works were translated by the Arabs and so reached Europe, but with the advent of the Mohammedans, science declined, and it has remained for the universities of Calcutta, Madras, Bombay, Allahabad, and the Punjab, and their large number of affiliated colleges to bring back the traditional love of learning to the Indian youth.

The Andaman and Nicobar islands in the Bay of Bengal are also under the Indian administration. The former group, consisting of the Little and the Great Andamans, divided by the Duncan Passage, with a total area of 2,508 square miles, has been used as a penal colony. The natives of these islands are of negrito race and of great interest to scientists. The Nicobar group consists of 19 islands, 12 of which are inhabited. The total area is 635 square miles.

The French, who were once supreme in India, retain the following stations and trading posts: Pondicherry, Karikal, and Yanaon on the Coromandel Coast; Mahe on the Malabar Coast, and Chandernagore in Bengal. These possessions, with a total area of 203 square miles, are administered by a governor residing at Pondicherry. The Portuguese retain a small area on the Malabar Coast called Goa (1,469 square miles), the seaport of Damao, 100 miles north of Bombay, and the island of Diu on the other side of the Gulf of Cambay.

For any subject not found in its alphabetical place see information

FACTORIES, MINES, *and* FIELDS *of the* "HOOSIER STATE"



Extent.—North to south, 276 miles; east to west, average width, 140 miles. Area, 36,354 square miles. Population (1920 census), 2,930,390.

Natural Features.—Rolling country with numerous small lakes in the north, with rolling hills and low broken ridges and knobs in the south (highest point, 1,053 feet, in Randolph County, 60 miles northeast of Indianapolis). Sand dunes along the shore of Lake Michigan in the northwest. Wyandotte Cave in Crawford County. Principal rivers: Ohio, Wabash, White, Kankakee, Maumee, and St. Joseph.

Principal Products.—Corn, wheat, oats, hay; cattle and dairy products, hogs, sheep, and horses; coal, building limestone, cement, clay; iron and steel products, railroad cars, packing-house products, flour, meal, and other foods; wagons and furniture, automobiles, glassware, brick, tile, and pottery.

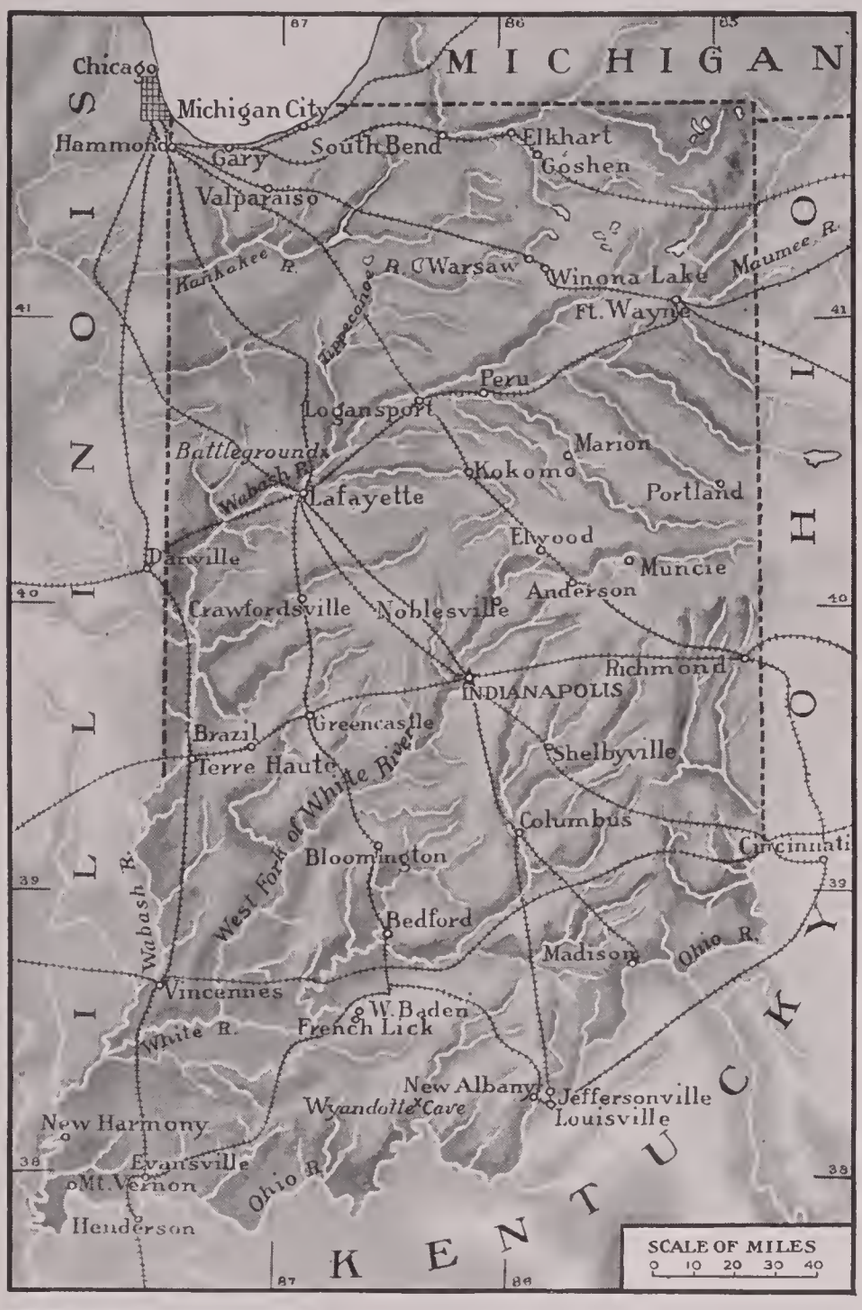
Chief Cities.—Indianapolis (capital, about 315,000), Fort Wayne (87,000), Evansville (86,000), South Bend (71,000), Terre Haute (67,000), Gary (56,000), East Chicago, Hammond, Kokomo, Muncie, Anderson, Richmond (25,000 to 50,000).

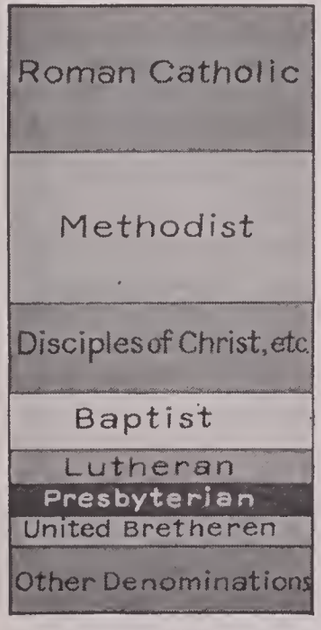
INDIANA. "A Hoosier," says George Ade (who is one himself), "is the happy average—happy, because he lives in Indiana!" In spite of its averageness and the fact that its people "are clotted around the exact center of population" of the United States, he claims that the commonwealth "is neither nebulous nor indefinite. It has a soul. It is individual." Why? Because, says Mr. Ade, in his humorous way, through its two early streams of immigration, from the South and later from the East, the state "was settled by pioneers who had the enterprise to seek new fields and the 'gumption' to unpack and settle down when they found themselves in the promised land. Indiana grows all the crops and propaganda known to the temperate zone. If a high wall could be erected to inclose Indiana, the state would continue to operate in all departments, but the outsiders would have to scale the wall in order to get their dialect poetry."

A panoramic airplane view of the state would show us, in summer, a wide green expanse mottled with brown plowed lands and golden fields of ripening grain, seamed with silver rivers, and, especially in the northeast, jeweled with many small blue lakes, memorials of the ice-sheet which once covered this northern region. While the state as a whole might at first glance seem monotonously level, closer scrutiny would show us that even in the flatter northern half there are variations of level; for the glacial lakes of the northeast lie strewn along the furrows between long stretches of steep morainic hills, and along the shores of Lake Michigan the yellow sand dunes—here barren and desert-like, there covered with binder grass, cottonwood, scraggy pines, and oak—sometimes rise to a height of nearly 400 feet. South of the marshy-banked Kankakee the broad glacial plain, spreading across central Indiana without a hill to break its expanse for many an hour's journey, rises near the middle of the eastern border just beyond Muncie to a wide dome 1,053 feet above sea-level, the highest point in Indiana.

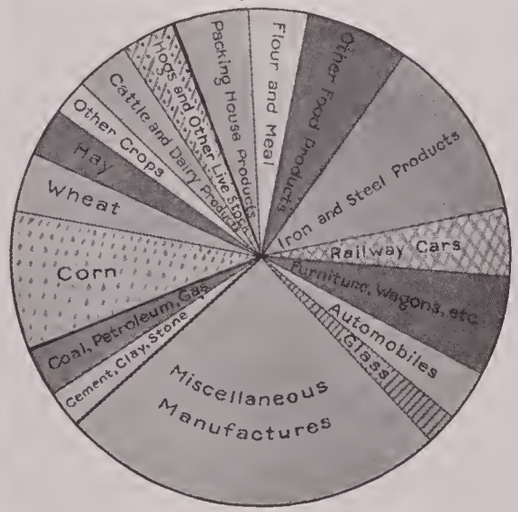
The southern half of the state is more irregular, rolling toward the east and west, and rising in the middle to a broken highland diversified by beautiful valleys, where lies Brown County, beloved of landscape artists. Southward from near Columbus to New Albany, on the Ohio River, runs a range of cliffs, the "Knobstone Escarpment," west of which stretches level limestone country, riddled with many labyrinthine caverns and curious "lost rivers" which, after flowing along surface channels, suddenly plunge into cone-shaped "sink holes" and are lost from sight.

Almost the whole of the state, except the south-central highland, is covered with glacial drift, in some places 400 feet deep, and the spring floods of the Ohio, the Wabash, and the White rivers have for centuries laid down deposits of rich sediment along their courses. This excellent soil and the fairly





The State of Indiana occupies the heart of what is, in many respects, the most prosperous portion of the whole United States. Notice how it was planned, with Indianapolis, its capital, in the exact center of the rolling plains, which are today rich farm lands.



equable climate and ample well-distributed rainfall of the state are the main bases of its wealth. In total quantity of the staple crops—corn, oats, wheat, potatoes, and hay—Indiana ranks fairly high among the agricultural states, and even higher, reckoning by production per acre and quality of the crop. Indiana corn has won many grand prizes and gold medals at national expositions, and special breadmaking value is claimed for flour made from Indiana wheat. Much of the corn raised is fed to stock, especially hogs, for Indiana is one of the six great pork-raising states. Among the minor crops that are still of considerable importance are onions and mint in the northern muck lands, tomatoes in the region a little north of Indianapolis, apples and peaches in the south-central part, cantelopes and watermelons in the southwest corner of the state, and tobacco in some of the Ohio River counties. Dairy cows, horses, and poultry are also important sources of farm revenue. Most Indiana farmers are American born of native white parentage. There is as yet no marked tendency toward large-scale agriculture; in fact, the average size of a Hoosier farm is 100 acres.

Indiana is a well-watered state, and its rivers, flowing through its early history—"with a strange tumult of battles, treaties, treacheries, massacres, gradually softening down to the sweet murmurs of peace"—meant much to its early development. The Wabash River system, bending eastward over the state like a lopsided elm tree before a western gale, drains the greater portion. The Ohio and its tributaries drain the southern border; and the northern portion is drained into Lake Erie by the Maumee and its tributaries, into Lake Michigan by the St. Joseph, and into the Illinois by the Kankakee. All these streams floated the canoes of the French trappers, fur traders, and Jesuit missionaries in the 18th century. The Ohio and its tributaries largely determined the course of the first immigration from Virginia, Kentucky, and the Carolinas, by which the southern portion of the state was settled in the late 18th and early 19th centuries. Many a pleasant, quiet stream was reddened in those early days by border battles now half-forgotten; only the name of the Tippecanoe, where the Shawnee Prophet was de-

A PATCH OF WILDERNESS SURROUNDED BY CIVILIZATION



For many miles along the Indiana shore of Lake Michigan stretches a range of sand-hills known as "the Dunes." Immediately back of this range is a prosperous farming country, and it is flanked at both ends by thriving industrial communities, but the dunes themselves are bare of inhabitants, save campers and picnickers. Curiously enough, many forms of semi-tropical vegetation, such as orchids and fly-catching plants, are to be found among these hills.

feated and the splendid dream of his great brother Tecumseh was shattered, remains memorable to this day. The lower Wabash, the lower White, and the Ohio rivers were highways for early commerce; and from 1820 to 1840 nine-tenths of the surplus produce of Indiana was shipped by flatboat down these streams to the Mississippi and to New Orleans. Today the only waterways in use in the state are Lake Michigan and, to a very limited extent, the Ohio River, the lower Wabash, and a small part of the White; nor are the rivers used to any great extent for water-power. The water supply of Indiana streams, variable at best since the destruction of the once great forests, has grown too irregular for profitable use.

No one could guess from the aspect of Indiana today that when the first settlers entered it the greater portion was covered with dense growths of magnificent hardwood trees—oak, walnut, beech, ash, maple, and the king of the Wabash valley, the giant sycamore—in all, more than 40 kinds of trees, which not infrequently reached a height of 100 to 190 feet and a circumference of 25 to 35 feet. It makes one shudder to realize that most of these huge and splendid forest monarchs did not even furnish timber or fuel, or serve any useful purpose. They were simply cut, piled in heaps, and burned with immense labor to clear the land for planting. It could not be helped. The forest was a barrier to progress, a foe to agriculture, and a refuge for Indians, bears, panthers, wild cats, and lynxes, as well as for deer and other gentler wild creatures.

The stout Hoosier pioneers, snatching at every opportunity to sweeten toil and hardship with fun and frolic, made the "log-rolling" a community festival. The 20 to 50 men of a neighborhood would gather early in the day with axes and handspikes at the home of one of their number, and, divided into opposing squads, would make a game of seeing which side could outdo the other in heaping the logs for burning. In the log cabin their women folk were busy quilting and preparing the feast of venison, roast turkey, fried chicken, hog, hominy, potatoes, hot cornbread, biscuit, and gingerbread, pies, preserves, milk, and cider. In the evening the young people would still have energy left for dancing and games, while a hundred flaring log bonfires lit the sky. Each settler received the same help from his neighbors, so the festivity was repeated many times during the season, usually April or May. The log-rolling was a splendid opportunity for political candidates to ingratiate themselves with the voters; an opportunity, too, for the canny farmer, who, it is said, would sometimes postpone his log-rolling until campaign time in order to profit by the enthusiastic labor of rival candidates. ("Log-rolling," by the

way, still remains in our political vocabulary as a term for barter of political favors and services.)

The energetic pioneers, alas! did their work of clearing all too well. Today most of the standing timber is undesirable second growth, much hillside soil has been washed away, ruining many farms, and the navigable streams have deteriorated.

Though its interests were long chiefly agricultural, Indiana has been developing industrially during the last half-century. Its two chief advantages for manufacture are its situation across the path of east-and-west travel, and touching Lake Michigan, and its extensive native coal supplies. To these two factors mainly it owes the almost miraculous growth of the industrial towns on the northeast border—Gary, Hammond, East Chicago, and Whiting—which largely share in the railroad facilities of their big neighbor, Chicago. Here, particularly at Gary, is concentrated the most important industry of Indiana, steel manufacture; for here Pennsylvania coke, Indiana and Illinois coal, Indiana limestone, and Lake Superior iron ore can be readily and cheaply assembled.

The raw materials for the next most important industry, slaughtering and meat-packing, are supplied by Indiana's farms. Three-fourths of the state's meat products are put up in Indianapolis, which is the chief railroad center as well as the largest city and state capital. Evansville, Terre Haute, and Fort Wayne also have meat-packing interests.

Manufactures which rank next after steel and meat-packing in importance are foundry and machine-shop products, turned out at Gary, Fort Wayne, East Chicago, Whiting, Terre Haute, and elsewhere; the manufacture and repair of railroad cars, at Hammond, Gary, Fort Wayne, East Chicago, Michigan City, and Jeffersonville; flour and grist-mill products, at Evansville, Richmond, and Terre Haute; and automobiles, at Indianapolis, Muncie, and Kokomo. The manufacture of agricultural implements is an important industry in which South Bend leads.

The first powerful impetus to Indiana manufactures was due to the discovery in 1885 of natural gas in northeastern Indiana, and later toward the center and southeastern part of the state. Many Indiana towns, such as Anderson, Elwood, Fort Wayne, and Muncie, were industrially stimulated by the cheap fuel supply; and when the gas was exhausted, the soft coal supplies from the southwestern part of the state took its place. There are about 50,000,000,000 tons of Indiana coal reserves; but only about 14,000,000,000 tons can be easily mined; about 1/18 has been mined already. Petroleum in commercial quantities was discovered in the Indiana portion of the Lima-Indiana field a few years after the discovery of natural gas. Oil production also has fallen off greatly from its first great production; and the two important refineries, at Whiting and East Chicago, respectively, operate chiefly on oil pumped in through pipe lines from the Mid-Continent field.

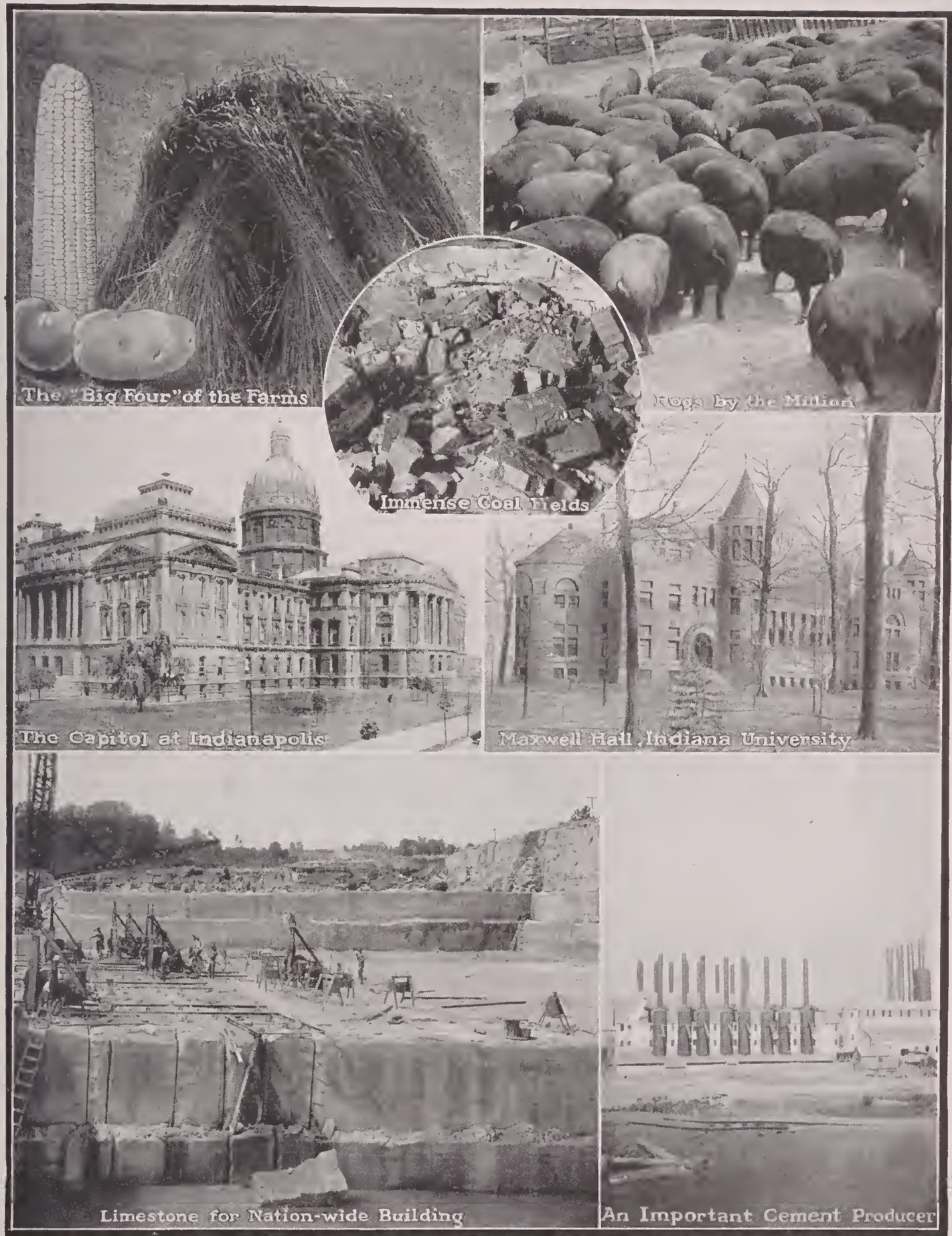
Among other native mineral products used in Indiana manufactures are marl and clay, used particularly in making portland cement, an industry in which the state ranks high; building, foundry, and glass sands, the last-named used at Muncie, Kokomo, Terre Haute, and elsewhere in glass manufacture; kaolin and other clays and shales used at Terre Haute in various pottery products; and limestone, used both for making lime and for building stone. The oölitic stone known as Bedford or Indiana limestone is prized and used all over the Union and forms an important industry. The mineral springs, chiefly in the southern part of the state, around which have grown up watering places like French Lick and West Baden, furnish waters for bottling and export.

A GLIMPSE INTO INDIANA'S FAMOUS STEEL INDUSTRY



Here we are in one of the many steel mills which make northern Indiana a famous metal-producing center. The glaring holes are the openings to the open-hearth furnaces, through which skilled workers watch the metal, and draw samples, as the workman has just done. The furnaces are tapped from another working floor, which is out of sight behind the row.

INTERESTING FEATURES OF "THE HOOSIER STATE"



Indiana's wealth is drawn largely from her abundant natural resources. Corn, apples, potatoes, wheat, and hogs come from her rolling fields, and underground are stores of coal, gas, and excellent building stone. In the great region in the north from Chicago to Gary are some of the country's largest steel mills. Indiana is also fortunate in possessing raw materials for cement making. The building stone quarries of Indiana are among the most famous in America. The picture in the lower left-hand corner shows how the noted "oölitic" limestone is cut right out of the earth in great blocks for shipment to all parts of the country. Indiana also has large quantities of fine clay for brick and tile making.

contained in the Easy Reference Fact-Index at the end of this work

Most of the industrial towns are situated in northern Indiana. This is partly because the people from the South, who mainly settled the southern half of the state, were more inclined to agriculture than to manufacture; partly because of the early start given to the northern industries by natural gas; and very largely because of the superior transportation facilities given by the railroads and Lake Michigan to the northern part of the state.

How the State was Settled

Yet this northern region was not settled until long after the southern portion had become comparatively well populated. This, too, was due to transportation conditions. Until the National or Cumberland Road was opened up in 1834, from Cumberland, Md., to Indianapolis, there was no avenue of approach for the north comparable to that afforded by the Ohio and lower Wabash for the south. About the same time a road was constructed across the state from Lake Michigan to the Ohio—that is, from the site of Michigan City through Indianapolis to Madison; and lake traffic began to be important with the settling of Chicago. From this time on a tidal wave of immigration swept over northern Indiana from New England, New Jersey, New York, and Ohio. The present transportation facilities of the state include service from the main steam railways between the Atlantic seaboard and Chicago and St. Louis, besides many north-and-south lines, and an exceptionally well-developed system of electric interurban lines.

The educational system of the state is completed by two institutions of higher learning, Indiana University at Bloomington and Indianapolis (which includes the state schools of liberal arts, law, and medicine), and Purdue University at Lafayette, which comprises the state schools of agriculture and mechanic arts. In addition there are a number of normal schools and non-state colleges.

The Hoosier is a natural story-teller, and the homespun literary tradition of Indiana is a direct heritage from pioneer times. Edward Eggleston's 'Hoosier Schoolmaster' was one of the earliest attempts to picture the raw frontier life of this country in fiction. Some Indiana writers, like that "Hoosier Arab," Lew Wallace, have gone abroad for inspiration, but others glory in being "provincial." James Whitcomb Riley is by common consent the state's poet laureate, and Booth Tarkington, George Ade, and Meredith Nicholson are among Indiana prose writers who have won more than local fame.

La Salle's Visit in 1669

The first white man of whom we have record as visiting Indiana was the Frenchman La Salle, who crossed the portage at South Bend in 1679. For 50 years thereafter only roving fur traders and Jesuit missionaries shared these forest solitudes with the Indian tribes. The French made the first permanent white settlement, not later than 1727, at Vincennes. Seized by the English following the fall of Quebec in 1760, then wrested from them during the Revolution by George Rogers Clark and his Virginia riflemen in 1778–79, the Wabash country under American control became part of the Northwest Territory. This was divided in 1800, the western part, including the present states of Indiana, Illinois, and Wisconsin and parts of Minnesota and Michigan, becoming Indiana Territory. Shorn successively of the territories for these states, Indiana was reduced practically to its present limits by 1809.

The first territorial governor was the brave and sagacious William Henry Harrison, later president, whose task it was to break Indian power during 1810–12, particularly by the battle of Tippecanoe, Nov. 7, 1811. In 1816 the state was admitted to the Union. The Indian title over the middle third of the state was not cleared until 1818, when what is known as the New Purchase was opened to settlement. In 1820 Indianapolis was founded as the capital, and in 1825 the state government was removed thither from Corydon, the capital since 1813.

Between 1816 and 1830 the population of Indiana had increased from about 65,000 to nearly 350,000. With the opening up of the northern part of the state, the offices for the sale of public lands became overwhelmed with business; and for a time Crawfordsville, the "town in the big flat woods," was the busiest land office in the United States. Between 1828 and about 1838 the state was "delirious with the fever for internal improvements." Roads, when properly constructed, remained a permanent gain; but the canals proved a failure. The whole program left the state bankrupt. Led by a great war governor, the iron-willed Oliver P. Morton, Indiana responded whole-heartedly to the call of the Union during the Civil War.

INDIANAPOLIS, IND. The symmetry and much of the beauty of Indianapolis arise from the fact that it is a "made-to-order" city. In 1820, four years after Indiana had been admitted to the Union and two years after the Indian title to this region was extinguished, the state legislature determined to plant the capital in the exact geographical center of the state. A site was selected on the west fork of the White River, in the midst of a great forest. The trees were cleared away, a circular plaza was marked off in the center of a four-block square, and diagonal avenues laid out radiating from each of the four corners. The rest of the streets were arranged in regular checker-board style. The magnificent trees cut down by the settlers in their ruthless war upon the forest had later to be replaced by others for shade. These have flourished greatly, giving Indianapolis the distinction of being one of the "forest cities" of the west.

Aside from its central location, Indianapolis has no great natural advantages, for the White River is not navigable at this point, but the early enterprise and the prosperity of its citizens soon attracted railway builders. The first line reached the city in 1847, and others followed rapidly. Today nearly a score of railroads radiate from the city, making it the largest

city of Indiana and one of the most important commercial and industrial centers of the Middle West. It is also perhaps the greatest interurban electric railway center in the world. About 20,000 people a day enter and leave the city by the handsome union interurban terminal station.

Among the notable public buildings are the State House and the County Court House, both built of the oölite limestone for which Indiana is famous and symmetrically placed at equal distances from the central plaza. In this central plaza, called Monument Place, where the Governor's Mansion stood in early days, is the beautiful Soldiers' and Sailors' Monument, 285 feet high, counting the 38-foot bronze statue of Victory which crowns it. The fountains at the base are said to be among the largest in the world, with a capacity of 18,000 gallons a minute.

The city has several important educational and charitable institutions. Among them are branches of the State University (including the School of Medicine); Butler College, located in a beautiful suburb to the east known as Irvington; Indiana Institution for the Education of the Blind, and Indiana Institution for the Education of the Deaf and Insane. Outside the city is an army post, Fort Benjamin Harrison. The motor speedway, a 2½ mile oval, is world famous. Important coal deposits not far from Indianapolis have served the city's thriving factories since the failure of the once abundant natural gas. Meat-packing is one of the most important industries, and the stock yards cover an area of 100 acres. There are also important iron foundries, flour mills, car shops, automobile, wagon, and carriage factories, furniture factories, and drug manufactories. Population, about 315,000.

IN THE BUSY CITY OF INDIANAPOLIS



This is a view in the center of the business district of the Indiana capital, showing the Merchants' Bank Building in the foreground.

INDIAN OCEAN. Two thousand years ago, when mariners were still venturing only the most cautious coastal voyages along the Atlantic coast, the Indian Ocean could already boast established trade routes, and the Egyptian Greeks boldly made their way across the open sea between Arabia and Hindustan though they had neither chart nor compass. They had nothing to fear if they avoided the hurricane months from December to April, for they had observed that the monsoon winds blow half the year in one direction, half the year in the opposite.

Washing the shores of Asia on the north, the Antarctic continent on the south, Africa on the west, and the East Indian islands, Australia, and Tasmania on the east, the Indian Ocean is the third largest of the five oceans. Its length from north to south is somewhat over 6,500 miles, its breadth 4,000 to 6,000 miles, and its area about 27,500,000 square miles. The average depth is between 11,000 and 14,000 feet, the deepest sounding so far being 20,340 feet off the southeast coast of Java.

At Cape Comorin, the southern tip of India, the Indian Ocean forks into the Bay of Bengal on the east and the Arabian Sea on the west, the latter branching again into the Persian Gulf. Beyond the Arabian peninsula it connects with the Red Sea. From Asia several great rivers enter it, the Ganges, the Brahmaputra, the Irrawaddy, the Indus, and the junction of the Tigris and Euphrates known as the Shat-el-Arab; and from Africa the Zambezi and the Limpopo. Its great islands are Ceylon and Madagascar, the rest of them—the Laccadives, the Maldives, Socotra, the Andamans, Nicobar, Mauritius, Bourbon, Kerguelen's Land—being mostly small groups of volcanic or coral formation.

INDIAN LIFE IN THE TEPEES OF OLDER DAYS



What small boy has not envied the Indian his roving life in the curious pointed tents made of skins, which he could take wherever fancy willed? Here is a group of these Indian dwellings, photographed on the shore of Saint Marys Lake in Glacier National Park. They fairly breathe the story of older days, when scouts, hunters, trappers, and Indians mingled in a life whose stories still set our pulses beating with the fever of adventure.

For any subject not found in its alphabetical place see information

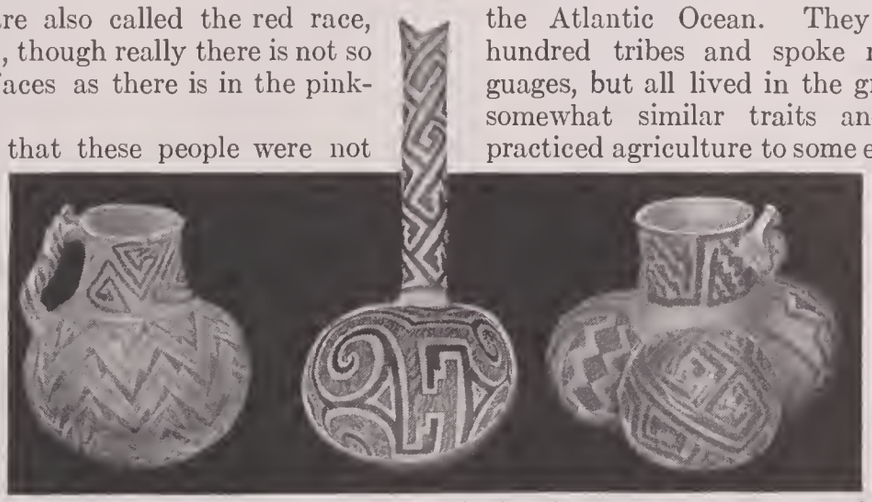


INDIANS, AMERICAN. When Columbus landed in the New World on Oct. 12, 1492, he found himself among strange-looking people of bronze or copper-colored skins and straight black hair. In his letter to the king of Spain telling of the land, Columbus called these natives *Indios*, because he thought he had reached India. This mistake of Columbus has been handed down to the present day, for we still call these people "Indians" though we add the word American to differentiate them from the natives of the real India, which lies on the other side of the world. Some learned men who have studied the American Indians have shortened the name to "Amerind." They are also called the red race, redmen, and redskins, though really there is not so much red in their faces as there is in the pink-cheeked white men.

When men found that these people were not natives of the real India, they began to wonder where they came from. Some said that they were the ten lost tribes of Israel; others that they came from western Asia. This last may be true, for the Indians resemble the Mongolians of Asia. Their eyes have a slight slant though not so much as have those of the Chinese, they have high cheek bones, and their hair is black as is that of the eastern Asiatic peoples. And the northern tribes of Asia are Eskimo, the same as one of the northern peoples in America (*see* Eskimos). But if the Indians came from Asia, they must have come centuries before Columbus, or even Leif Ericson and his Northmen, discovered America.

It is hard to describe the American Indians and the way they lived, for there were many different tribes just as there are many different nationalities among the white race, and their appearance and ways of life and their languages were different.

The white settlers on the Atlantic seaboard first came into contact with the Indians of the eastern wooded area, who roamed over all the land on both sides of the Great Lakes from the Mississippi River to the Atlantic Ocean. They numbered several hundred tribes and spoke many different languages, but all lived in the great forests and had somewhat similar traits and customs. They practiced agriculture to some extent and used wild rice as food, but depended largely upon the chase for their existence.



Doesn't it seem strange that a people who in other respects were crude and savage should have had the art instinct so strong that they would carefully decorate their household utensils, as the Tularosa Indians of New Mexico did with these pieces of pottery? It seems that, since time began, the impulse to create art has been as natural as the appetite for food.

Most of the Indians in this region belonged to the Algonquian group, which included the Delawares (or Lenape), Potawatomies, Sauks (Sacs) and Foxes, Kickapoos, Piankishaws, Narragansetts, Mohicans (or Mohegans), and many others. The French explorer Cartier met members of this family when he ascended the St. Lawrence, the English colonists encountered

A CITADEL IN THE DESERT



The Hopi Indians of the southwestern United States used to build their villages on flat-topped hills or mesas like this, as a protection against their enemies. Some of the houses were constructed on the roofs of others, and were reached with ladders. A few of these old villages are still inhabited.

them on the coast of Virginia, the New Englanders fought them in King Philip's War, and William Penn made a treaty with them on the site of the present city of Philadelphia. These Algonquian tribes had a high degree of clan organization, and at various times formed great confederations against the whites.

Living in the midst of the Algonquian territory, in what is now New York state, were the warlike Iroquois. They were sometimes called the Five Nations, for the Mohawks, Oneidas, Onondagas, Cayugas, and Senecas were united in a confederacy—a sort of "league of nations"— to abolish war among themselves. After 1715, when the fierce Tuscaroras joined them, the confederation became known as the Six Nations. But though they abolished war among themselves, their name carried terror to the whites and to other redskins. For many years they fought the Frenchmen, who first won their hatred when Champlain aided their enemies, the Hurons and Algonquians (*see* Champlain, Samuel de). They destroyed all except a few isolated settlements of the Hurons, and they drove the Ottawas from the vicinity of the river in Canada which still bears their name.

THE PIPE MAKER'S ART



Here are more interesting examples of art among primitive people—fragments of the stone pipes of the Iroquois Indians carved into strange forms.

South of the Algonquians and Iroquois, and extending from the Carolinas and Georgia to Texas and Arkansas, lived a race of Indians who were weaker in war than their northern neighbors, but nevertheless formed one of the highest types of Indian culture north of Mexico. They were an agricultural people, living in permanent villages, and made good pottery and some cloth. Like the woodland Indians, they had complex political organizations and religious ceremonies. Their principal tribes were the Cherokees, Creeks, Chickasaws, Choctaws, Seminoles, Apalachicolas, Natchez, and Tuscaroras.

The greatest rovers among the Indians were those who inhabited the great plains between the Mississippi and the Rockies. These tribes lived almost entirely

upon the buffalo, which furnished them with food, clothing, and shelter. They made no pottery, wove no cloth, and did not practice agriculture; they roamed at will over the prairies, setting up their tents of buffalo hide (tepees) wherever the buffalo led them. Typical tribes of this group were the Sioux, the Assiniboins, Arapahoes, Blackfeet, Crows, Cheyennes, Comanches, Gros Ventres, and Dakotas. On the eastern border were the Mandans, Omahas, Osages, Pawnees, and Wichitas, who sometimes lived in earth or grass-covered houses in permanent villages, though using tepees when on the hunt. In the northeast around Lake Winnipeg were the Cree and Ojibwa, and in the far west the Nez Percé, Shoshone, and Ute tribes.

COMBS WORN BY INDIAN BELLES



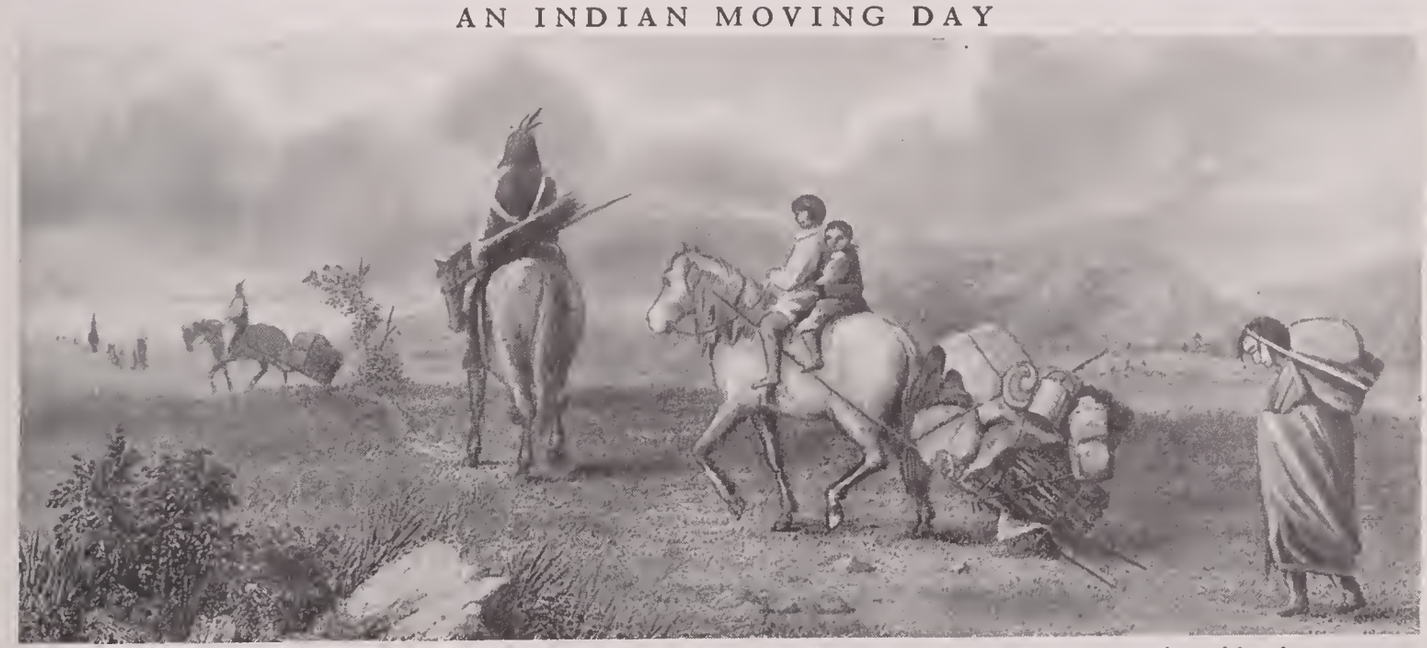
As far back as we have any record, women have used combs in dressing and decorating their hair. These combs made from the antlers of deer at one time adorned the black locks of Iroquois belles. The figure in the center was once part of a comb.

These three great divisions include the Indians with whom we are most familiar, those whose deeds are recorded in the general history of North America. But there were many others besides these. In the southwest, chiefly in Arizona and New Mexico, were the Pueblo Indians, whom Cortez and Coronado found living in their homes of sun-dried brick, and whose descendants live in the same sort of houses today. They comprised the Hopi, Zuni, Taos, Apache, Mojave, Yuma, and Maricopa tribes, and the Navajos, whose beautiful blankets are justly famous. In California and the Great Basin lived the "digger" Indians, a mild race of low intelligence, who existed upon acorns (from which a kind of meal was produced), the seeds of wild grasses, and roots. Their principal tribes were the Washos, Yumans, and Maidus. On the plateaus in the Northwestern States and in British Columbia were found the Bannock, Snake, Nez Percé, Flathead, and Kutenai (Kootenay) Indians, who lived largely on salmon from the Columbia River and vegetable foods, but practiced no agriculture. In the north they sometimes lived in underground houses, and in the south brush shelters were common.

On the northern Pacific coast lived a race of canoeists and fishermen, highly developed in wood work, who built elaborately carved totem poles before their homes to show to what clan the inmates belonged. The most typical tribes of this north Pacific area were the Tlinkits, Nootkas, Bella Coolas, and Chinooks. Many of these western Indians are of the great Athabascan stock, the principal tribes of which are found in Alaska and Canada. In the cold north they lead a life similar to that of the Eskimos, but farther south they lived in tents and depended on the caribou as the Plains Indians did on the buffalo.

We know now that there were other tribes of Indians who had disappeared before the coming of the white man. These were the mysterious "mound-builders," whose grass-grown mounds dot the northern region between the Alleghenies and the Rockies. For a long time people wondered about these queer-shaped mounds, many of which resemble animals'

AN INDIAN MOVING DAY



Among tribes that possessed horses, the head of the family rode in state, with his weapons ready to turn against either foes or game. In place of a wagon, a long pole was fastened to each side of the draft horse, and all the baggage possible was lashed to the dragging ends of these poles. The squaw carried what was left on her back, with a leather thong about the forehead to help support the load.

figures. But now, since many of the mounds have been dug into, it is fairly well established that they were the work of some ancestors of the Indians that the colonists knew (*see* Mound-Builders).

The Indians that the Puritans Met

The Indians that the Puritans met in the Massachusetts wilderness were like others of the race, of a coppery or reddish-brown color. They had abundant long straight black hair and high cheek bones. The Puritans did not like their redface neighbors very well. The ways of the Indians were not their ways. They distrusted a person who would not fight in the open, but slipped upon his foe unawares. And yet to the Indian this craftiness was a mark of superiority. He considered it only a matter of strength to kill an enemy in the open, but to be able to steal upon him and kill him from ambush showed skill and cunning.

But though the Indian was a bad enemy, he was a good friend. His generosity in furnishing the colonists corn sometimes saved them from starvation. His instruction in planting corn and fertilizing it with fish waste enabled his paleface brothers to care for themselves. And the friendly warning of a friendly Indian at times saved the Puritans from massacre by hostile braves.

When the whites first came to America more than 200 languages were spoken north of Mexico and the number of dialects ran beyond a thousand. The settlers could learn an Indian language only by talking to the redmen, for none of the tribes they met had any form of writing and no tribe anywhere in America had more than a rude picture writing. Figured wampum belts were often used to help the redmen remember the details of treaties or of important events. In every tribe there were legends, some more fanciful than true, of the history of the tribe. And when the day's work was done and all were gathered around the camp-fire, the old men and old women would tell these tales.

The women did what seems to us the hardest work. They planted the squashes, and the corn and beans from which they made succotash, an Indian dish which we have borrowed. They dressed the skins of the animals and made the clothes for the family. They cooked the meat on sharp sticks over the fire. They cared for the children. Until the papoose was a year old they carried the baby on their backs or hung the board cradle on a tree while they did their work. And when the family wigwam was moved it was the squaws who carried the burdens and set it up in its new location, and built the camp-fire—which was not an easy task when we remember that the Indian had neither matches nor flint and steel, but made fire by rubbing pieces of dry wood together.

But the women were not mere drudges, at least among the Indians that the Puritans knew. They had a voice in deciding important questions, and among the Iroquois the braves could not go on the warpath without the consent of the women.

The houses were the property of the women, and woe to the brave who did not bring home deer enough to feed the family or to the man who showed himself

PROPITIATING THE GOD OF THE WATERS



Here a group of Blackfeet Indians are offering prayers to the god who rules the waters of the lake beside which they are seated. Every prominent aspect of nature had a presiding deity, according to Indian belief, and the prayers to each god consisted of fixed ceremonies. These were performed whenever deemed necessary by the medicine men. In this case, the tribe might intend to go fishing, so naturally the favor of the water god is being sought.

INDUSTRY AND RELIGION AMONG THE HOPI INDIANS



At the left a woman is making pottery. In the doorway at the right, a mother is rocking her baby in a curious cradle held on her feet and knees, while next to her a blanket-maker is at work. The old man in the distance is spinning.



This is a Hopi "Church" filled with figures of Indian gods. The one with the crown represents Happiness. By his side is Wealth, while on either side of the central frame are figures representing the Sun-god, with rays springing from his head.

contained in the Easy Reference Fact-Index at the end of this work

a coward on the warpath. He was apt to be told by his squaw that there was no room for him in her wigwam, that he had better go back to his mother.

And that brings us to the work of the man. He must hunt and make war. But hunting was not done for amusement. It was to get something for the family to eat, for most of the food was gained by hunting and fishing.

There was one form of work, however, of which the Indian brave never seemed to tire—that was war. There probably was never a time when numerous conflicts were not taking place in some parts of the continent. The redmen went to war if another tribe encroached upon their hunting grounds, or if a member of their tribe had been killed by a band from another tribe, or sometimes apparently only for excitement. A brave, wishing to distinguish himself, and perhaps to win the favor of some Indian beauty, would announce that he was going against an enemy and ask others to join him, and so the conflict would begin. However it arose, Indian warfare was carried on with all the cunning and cruelty of which the Indians were capable. If possible they fell upon the enemy unawares and massacred men, women, and children, each brave anxious to take as many scalps as possible. Or they might take a few prisoners back to their village to torture with fiendish delight. Occasionally, however, a few boys or young men were adopted into the tribe to take the place of fallen sons or brothers or husbands.

ARCHITECTURE OF THE HUNTING TRIBES



While the Hopis built substantial villages of mud and stone, the wandering hunters, such as the Apaches, were content with simple houses like the one this squaw and her daughter are putting up. These arched branches will be covered with skins or canvas, and then the dwelling is ready.

Because his enemy tried to slip up on him, the Indian fortified his village. The Indians that the Puritans knew lived in villages of wooden huts for at least a part of the year. The Iroquois lived in long wooden or bark houses with a passageway down the middle. These houses were from 50 to 100 feet in length and not more than 15 feet wide. There was no window but there was a doorway at each end, blankets or skins serving as doors. On each side of the passageway were rooms or rather stalls divided by partitions of skins. In each of these rooms a family lived. In the passage were fire-pits, one for each four families.

The houses of the Algonquian tribes were smaller than the Iroquois homes, and around a whole group of them was a high stockade. There was little furniture in the house. Some skins or blankets served as beds; there were no tables or chairs or stoves.

But whether large or small, all of these houses were so full of smoke and so dirty that it must have been a welcome relief in the summer to live in the more open wigwams. These were simply constructed, of poles fastened together at the top, with skins or matting made of rushes spread over the poles. It was in a tepee made like this and covered with buffalo skins that the Plains Indians lived all the time; and as the eastern Indians were pushed back from their old homes they, too, adopted this as their regular way of living.

But though the homes were dirty ones, they were not unhappy ones. All listened eagerly to the tales of the story-tellers. They delighted in all sorts of games of chance, for the Indians were born gamblers. And whether winning or losing they never lost their good nature, but laughed just as heartily when beaten as when victorious.

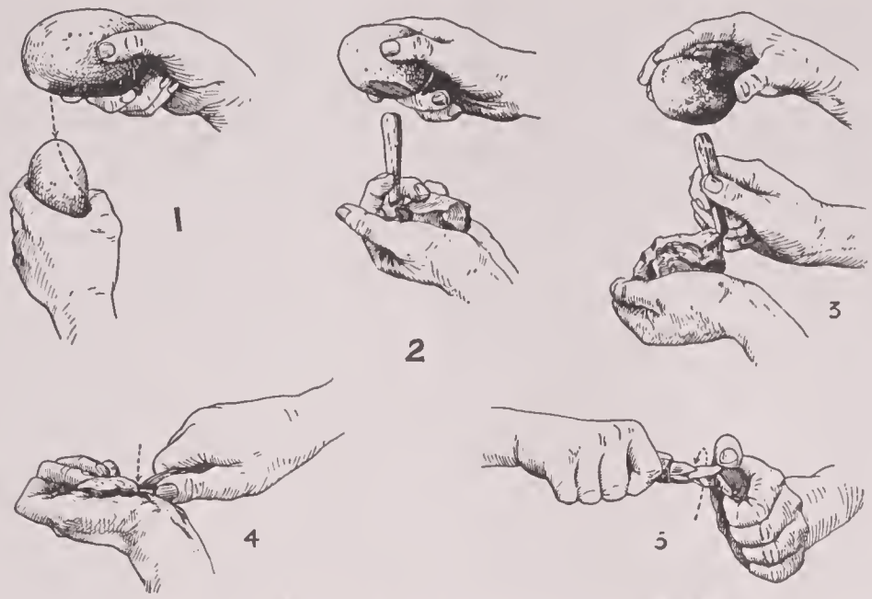
The boys had their ball games; they flew their kites of fish bladders, spun their teetotums, played at tag, hide-and-seek, and blind man's buff. The girls, though brought up to work long and hard, still enjoyed their strange-looking dolls in such leisure hours as they had. And both boys and girls were fond of making mud pies.

Their clothes were made from skins dressed until they were very soft. For trimming dyed porcupine quills, beads, and buckskin fringes were used. Boys' and men's clothes were trimmed as much as women's. Down the side of their leggings ran buckskin fringes. Beads adorned their soft deerskin moccasins and their buckskin jackets or shirt, and around their necks were necklaces of elk teeth, badger claws, or bear claws. The women's short full skirts and jackets were also of buckskin and fringed about the bottom. And the blankets which the men wore were usually made of soft tanned animal hides.

The dances in which the Indians engaged usually were not for amusement, but were a religious cere-

monial, or for some magical purpose. The war dance, in which the men were painted as if for war, was intended to influence them in war. The scalp dance was in celebration of victory. The buffalo dance of the Plains Indians was to compel the coming of herds of that animal. The sun dance followed several days of fasting and prayer, and the snake dance was but a small part of a nine days' ceremonial.

MAKING ARROW HEADS OF STONE



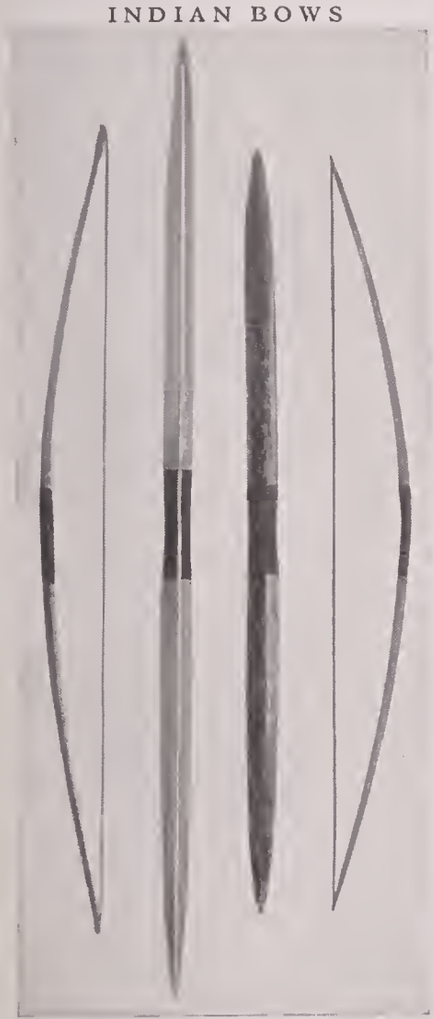
Before the white man came, the Indians of North America made their Arrow Heads as here illustrated: 1, shaping a stone by hammering it with another stone; 2, fashioning finer work with the aid of a stone "chisel"; 3, a more delicate task requiring the aid of an assistant; 4 and 5, finishing the edges by chipping and flaking away the rough places with "pliers" made of bone.

The Indian had very complicated religious observances. Besides the Great Spirit, he believed in many other spirits, some good and some bad. The spirits were all about him, in plants and trees and rustling leaves; they were in the wind and cloud and rain; they were in the mountain and in the brook. It was spirits that caused trouble, suffering, and death. When a man was ill some bad spirit had entered into him.

And so the Indian had his medicine-men who knew how to gain power over these spirits and drive them away. By muttering magic words, by tricks, and by screaming and making a loud voice, these medicine-men were supposed to overcome the evil spirit. But the palefaces found that the medicine-men knew, too, the healing qualities of many herbs and roots which they used along with their charm.

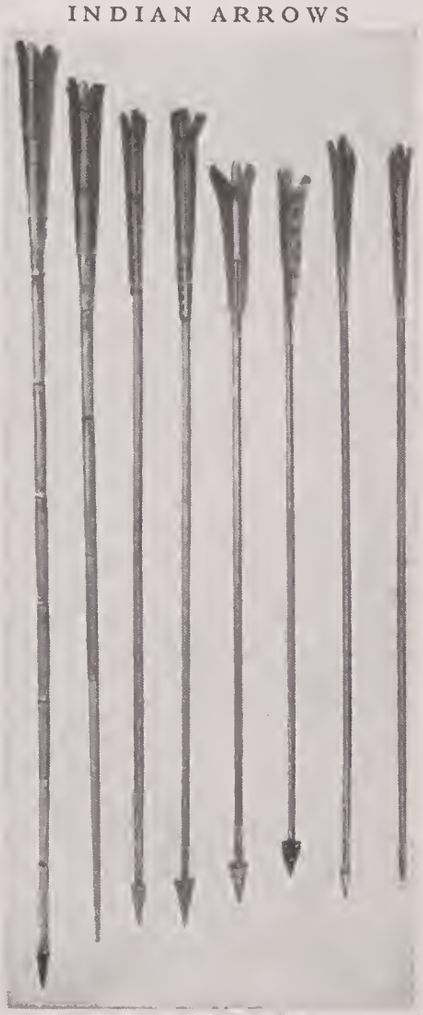
Such were the Indians that the white men found in the American colonies. But contact with the whites did not improve the savage Indian. At first he regarded the paleface with awe, thinking he descended from the "Great White Manitou" or spirit. When he discovered that the white man was no supernatural being, he welcomed him as a brother. For a few glass beads, some bright red cloth, or other trifle which took his eye, he was willing to share his fields with his paleface brother. He was accustomed to sharing things, for the possessions of the Indians are common property of the tribe or family. When he found that this paleface brother intended to keep the land for his own use, and shut the Indian out of his hunting ground, he became angry. Instead of being a brother he became an enemy. Even when the white man was friendly the Indian was suspicious. As he was driven farther and farther back into the continent, and as he saw that the white people had come to stay, he became more and more bitter. By the time the

INDIAN BOWS



1, hickory bow, a strong-shooting bow; 2, ash bow; 3, yew bow, backed with tendon; 4, yew bow, rawhide back.

INDIAN ARROWS



These are various types of arrows used by the Yahi Indians of California, who also made the bows shown on the left.

whites came to Kentucky and other central states, the Indian was so hostile and the conflicts between the two races had become so deadly that Kentucky was known as the "dark and bloody ground." Daniel Boone could not have lived there if he had not been a renowned Indian fighter.

This hostility of the redmen was played upon by English, French, and Spanish in their contests for territory. Each side used the Indian to murder its enemies and burn their homes. One of the grievances of the Americans at the time of the War of 1812 was that the English incited the Indians against the western settlers. They paid their allies in trinkets, guns, and ammunition, and in fire-water. The last was the most effective, for if an Indian was a dread foe when he was sober, he was doubly to be feared when drunk. There was nothing that he would not do when in that condition. That is the reason that the United States made it a crime to take whisky or other alcoholic liquors into an Indian reservation.

INDIANS PLAYING BALL ON THE ICE



Writers of Indian tales have often pictured the redmen as solemn dignified persons who didn't seem to get much fun out of life, except when burning a village or taking a scalp. The truth of the matter is that among themselves the Indians, when not engaged in warfare, were happy laughter-loving people. This old drawing shows a group of braves playing the game from which modern lacrosse originated. It could be played on land or on the ice. A round stone served for a ball and was caught up and thrown with these crook-ended sticks. Thongs woven across the crook made a sort of pocket. The players divided into two teams, and the object was to throw the ball through the opponents' goal.

Some Famous Indian Wars

The earliest notable conflict with the Indians in New England was the Pequot War of 1637–38. This was soon ended by one bold stroke of the English settlers, who carried the Pequot camp by storm and massacred its inhabitants. In 1675 the very existence of Plymouth was threatened by King Philip's War, when the coast Indians formed a great confederation to drive the whites from the continent. For two years, until the death of their leader, "King Philip," in 1676, there were frightful scenes of massacre and the burning of whites alive in many places.

Numerous conflicts occurred from 1689 to 1763, in which the English, aided by the Iroquois, fought the French and the Algonquian Indians (*see* French and Indian War). After the overthrow of the French in America the daring Ottawa chief Pontiac, angered because his allies had surrendered the Mississippi Valley region to the English, organized an attack on all the 14 British garrisons and settlements in the West. He had earlier led his people at the time of Braddock's defeat (1755), and cherished an abiding hatred for "those dogs in red." In many places the Indians were successful, but at Detroit, where Pontiac commanded in person, they were forced after five months to raise the siege (October 1763). In 1765 Pontiac concluded a treaty of peace with the English, and in 1769 he was murdered at Cahokia, Ill., by an Illinois Indian. He is regarded as one of the greatest of the American Indians.

During the American Revolution the Indians, with the exception of a few tribes, took the part of England against the colonists, largely because of the old alliance with the Iroquois. Immediately preceding the War of 1812 occurred the formidable movement organized by Tecumseh, which was frustrated by the battle of Tippecanoe, on Nov. 11, 1811 (*see* Tecumseh). Other Indians besides Tecumseh's followers aided the British in the War of 1812. In the South occurred the uprising of the powerful Creek Indian confederacy, whose tribes held a large part of Georgia and Alabama. Fort Mimms on the Alabama River was captured by them and 400 men, women, and children massacred (Aug. 30, 1813). United States troops, however, defeated them in numerous engagements, and Gen. Andrew Jackson finally crushed them at Horseshoe Bend (March 29, 1814). More than 2,000 of their warriors were killed, and their towns burned and their lands ravaged. Later there were troubles growing out of the attempt to remove them to Indian Territory, but in 1836 Gen. Winfield Scott reduced them again to submission. About 25,000 were then removed to the Indian Territory reservations west of the Mississippi.

In 1831 Black Hawk, chief of the Sacs, began the Black Hawk War as a result of disputes over the cession of Indian lands in Illinois. Driven back over the Mississippi River by a force of Illinois militia, he returned in 1832 and renewed his attacks on white

WORK OF THE MEDICINE MEN AMONG THE INDIANS



villages. After two decisive defeats, the war was brought to an end by his surrender in August. About the same time (1832) the Seminole Indians in Florida refused to ratify a treaty providing for the removal of their tribe west of the Mississippi. This led to a war which lasted seven years and cost hundreds of lives. In the end the whites were victorious and most of the Seminoles were removed to Indian Territory.

When white settlement advanced beyond the Mississippi the ancient struggle with the aboriginal possessors of the soil was renewed. Between 1860 and 1870 the Apaches terrorized the young territory of Arizona, burning and destroying the towns, and slaughtering about a thousand whites.



The top picture shows the ceremony of initiating candidates for the position of medicine man among the Winnebagoes. The medicine men formed a sort of secret society, the older members of which initiated the younger ones in the principles of their art. The candidates, who have fasted for several days, are seated at the far end of the long hut. Each old medicine man then parades about the hut and makes a speech, carrying his medicine bag as he goes. After each one has spoken, the old members of the order mass at one end, advance upon the candidates, and knock them over with the medicine bags. When the candidates are permitted to arise, everyone present joins in a ceremonial feast and dance, and the candidates are then full-fledged medicine men. The lower picture shows a medicine man at work charming away the "spirits" who have brought illness to the patient.

Sporadic outbreaks continued until the last hostile band under Chief Geronimo surrendered in 1886.

Equally formidable opposition to the white man's advance in the Northwest was offered by the great Sioux chief, Sitting Bull. During the Civil War he led warlike bands to the attack of white settlements in Iowa and Minnesota, but in 1864 he and his people were driven into the country of the Big Horn and Yellowstone rivers. From 1869 to 1876 he was continuously on the warpath, raiding frontier settlements. In the latter year, the attempt of Gen. G. A. Custer with 208 U. S. army troopers to force him to return to his reservation failed, and Custer and his whole force were trapped and massacred. After five years of pre-

carious refuge beyond the Canadian border, Sitting Bull accepted an offer of pardon from Gen. N. A. Miles and returned to United States territory. He steadfastly opposed the cession of further Indian lands to the whites, and when a "Messiah craze" broke out among the Northwestern Indians in 1890, Sitting Bull was placed under arrest. In a struggle which followed, he and his son were both killed. With the passing of Sitting Bull and Geronimo the Indian resistance to the white man's advance practically ended.

The Indians are often spoken of as a "vanishing race." People say that after a time there will be no Indians in America, that they are rapidly disappearing; but this is not true. It is true that for a time the redmen seemed to be decreasing. When the white men, first tried to force them to adopt a civilized way of living, many Indians contracted tuberculosis. Many others died of measles and other diseases from which they had not suffered before the coming of the white man. But today the number of Indians in the United States is not decreasing.

Of course, there are not so many Indians now as there were when Columbus first landed in America. It has been estimated that in 1492 there were about 1,115,000 redmen in the United States and Canada. Even now there are more than 290,000 Indians in the United States and Alaska, and this is an increase over the numbers shown in previous censuses. It is estimated that in Canada there are about 115,000. Together there are more than 300 tribes.

Of course, not all of these Indians are pure-blooded. Many Indians have intermarried with the whites. This is especially true in Canada, where from the earliest days the French mixed with the Indians, just as in Mexico and South America the Spanish intermarried with the native race. In spite of the well-known example of John Rolfe and Pocahontas, not many of the English settlers married Indians. But today you find descendants of mixed blood from later marriages on the Indian reservations.

The United States government for many years followed the policy of concentrating the Indians on reservations under the control of the Commissioner of Indian Affairs, an official in the Department of the Interior. The largest of these reservations was Indian Territory, now a part of Oklahoma, and many other reservations dot the western states.

On these reservations the Indians lived in tribes just as they had long ago, and their relations to the United States were determined by treaties between the tribe and the nation. They were in fact a state within a state. But in 1887 Congress passed a law providing for giving to each Indian an allotment of land and selling the rest of the reservation for the benefit of the tribe or nation. This money is used to maintain schools for the tribes. There is also a college for the Indians at Carlisle, Pa.

The process of dividing and selling the land progresses slowly. The Indians living on their own land are now recognized as citizens of the United States, subject to the same laws as white men.

The picturesque Indian has disappeared to a large extent. In this sense the redmen are a "vanishing race." But they have left their traces behind them. Along their forest trails are now built great railways of the country. At the posts where they brought their furs to the early traders large cities have sprung up. And Indian names dot the map of the whole country from Massachusetts to California.

INDIAN ARCHITECTURE AT ITS BEST



Although most tribes contented themselves with shelters made of grass or skins, some were quite advanced. This log house was built by Creek Indians in the latter part of the 18th century, and compared favorably, as you can see, with the homes erected later by the white settlers in the same territory.

For any subject not found in its alphabetical place see information



LITTLE EAGLE-HEART *and His Sister* LAUGHING-WATER

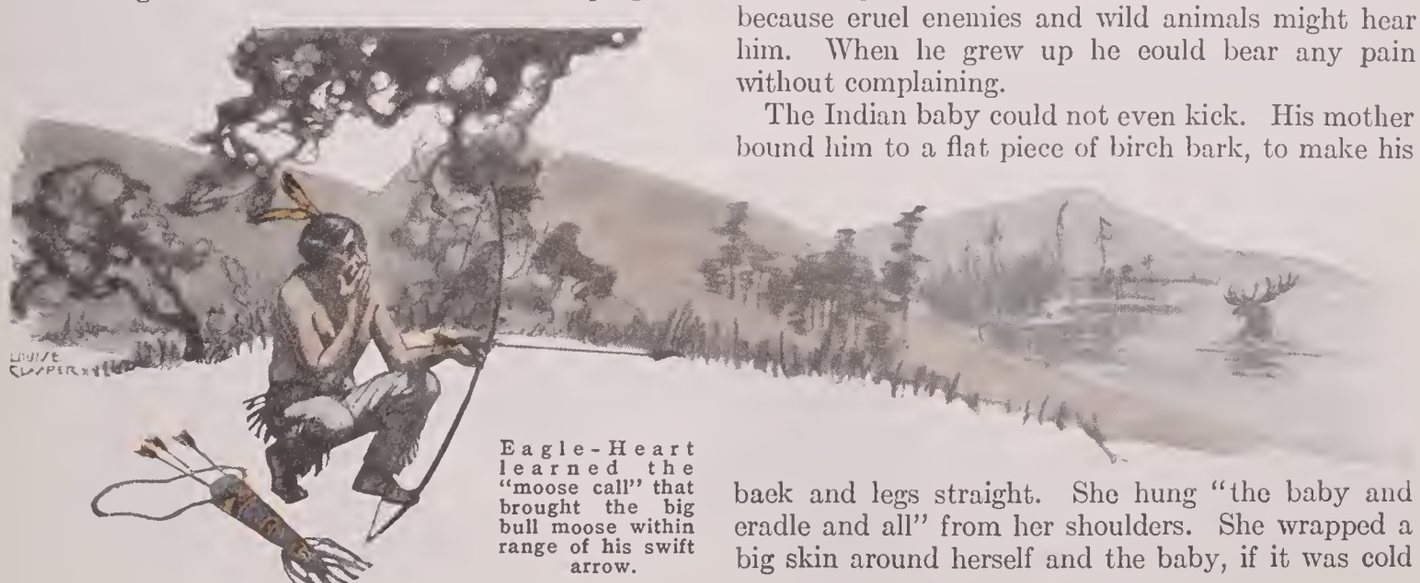
YOU are proud of being an American boy, aren't you? Perhaps you will be surprised to learn that there is another boy who has a better right to the name than you have. He was here more than 400 years ago, when Columbus sailed across the wide ocean and found our country.

This American boy was tall and straight and slender. His eyes were as black as ink, his hair as black as a crow's wing. He could run like a deer, swim like a fish, and climb like a squirrel. He was as solemn as a little owl. When he grew to be a man he wore a head-dress of eagle feathers. His skin was not white, like yours. It was very nearly the color of an English penny or an American one-cent piece. Now you know what he was. He was an American Indian. There are still a great many Indians in our country. Most of them live in houses, or on farms. They dress like white boys, speak English, and go to school. But their faces are the same as those Columbus saw.

It was a hard wild life the Indian boy lived. Still, he had a good deal of fun. It was like camping out all the time. There were about a million Indians here, and the country was so big that there was room for everybody to move about a good deal. There were no cities or farms, no railway trains or wagons, no horses even or cattle. Dogs were their only tamed animals. The Indians had to travel on foot. They followed narrow paths, or trails, through the forests and over the plains. On the rivers and lakes they made long journeys, in boats so light that they could carry them on their shoulders from one stream to another. These boats, called canoes, were made of birch bark stretched over frames of wood. A great many Indians traveled together, for company and for safety. Each band was called a tribe and each had a chief. When a tribe found a good place to camp, the tent poles were stuck in the ground in a circle. The top ends of these poles were tied together. Then the skins of wild animals, or mats woven of rushes, were fastened over the poles. They called this tent a wigwam. Some Indians built dome-shaped wigwams, like tents. Others built long houses of bark, big enough to shelter many persons.

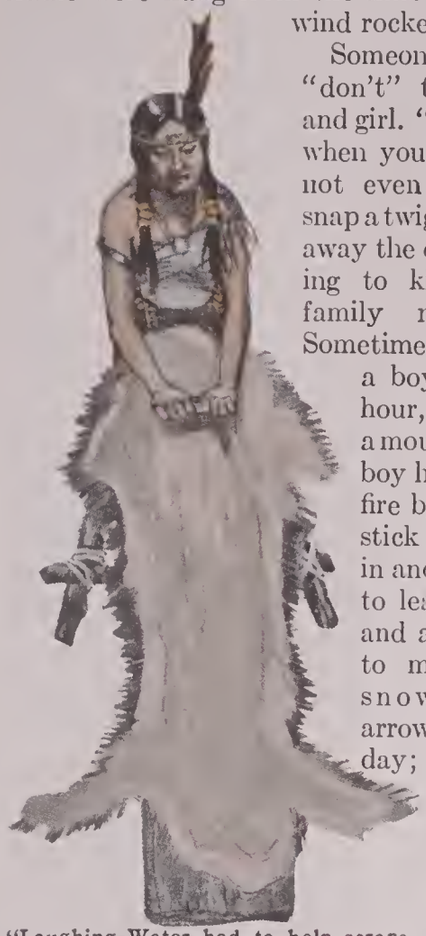
Our little Indian boy was born in a wigwam, in a village of other wigwams in the forest. His mother put a long shirt of soft yellow deerskin on him, and taught him his first lesson before he was a day old. She taught him that he must not cry. When he cried she put her hand over his mouth. She did this because cruel enemies and wild animals might hear him. When he grew up he could bear any pain without complaining.

The Indian baby could not even kick. His mother bound him to a flat piece of birch bark, to make his back and legs straight. She hung "the baby and cradle and all" from her shoulders. She wrapped a big skin around herself and the baby, if it was cold



Eagle-Heart learned the "moose call" that brought the big bull moose within range of his swift arrow.

weather, leaving his face uncovered so he could see. Then they went "by-by." Any baby would like that. When the tribe stopped to rest, the baby and his cradle were hung from the limb of a tree, and the wind rocked him to sleep.



"Laughing-Water had to help scrape the hair from deer-skins with sharp clam shells and rub and pull the skin until it was as soft as a kid glove."

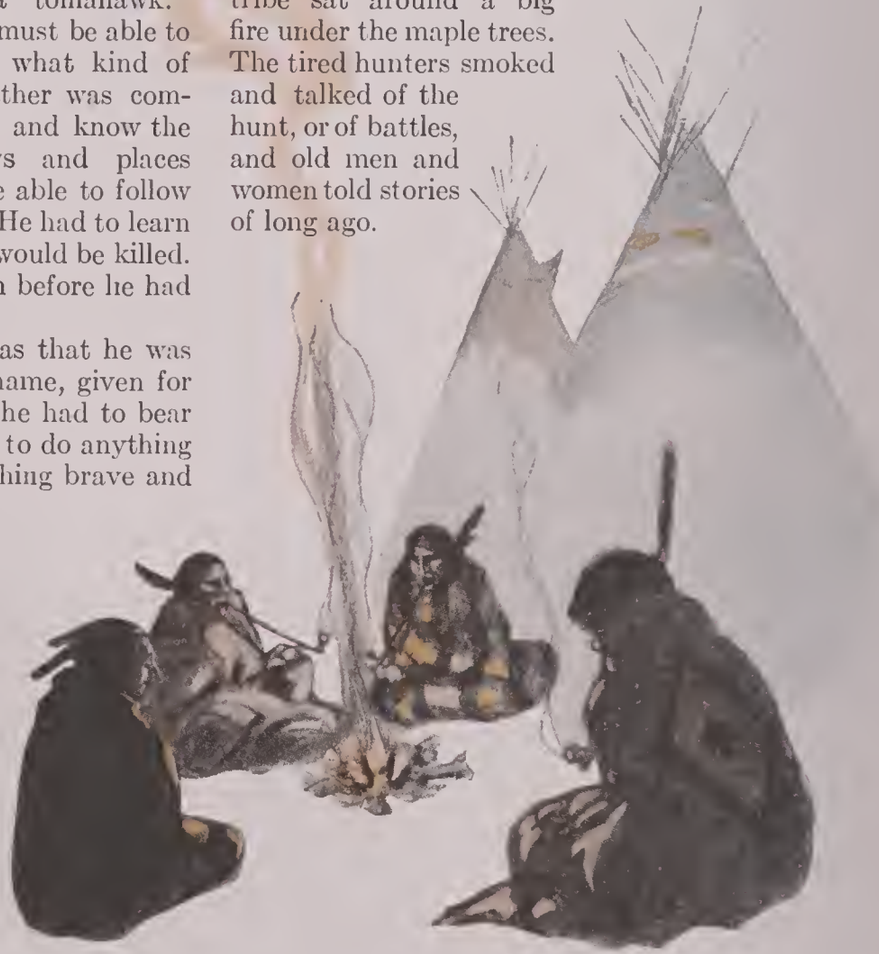
Someone was always saying "don't" to the Indian boy and girl. "Don't make a noise when you walk. You must not even rustle a leaf, or snap a twig." That might scare away the deer father was trying to kill, and then the family must go hungry. Sometimes, when out hunting, a boy had to lie for an hour, as quiet as pussy at a mouse-hole. The Indian boy had to learn to make fire by twisting a pointed stick rapidly in a groove in another stick. He had to learn to make a bow and a stone arrow-head; to make a canoe and snowshoes. He shot arrows at a mark every day; he speared fish, and learned to use a stone hatchet, called a "tomahawk." He must be able to tell what kind of weather was coming, and know the ways and places and calls of animals and birds, and be able to follow the tracks of men and wild beasts. He had to learn how to fight, too, or he and his family would be killed. The Indian boy was grown to a man before he had learned all his lessons.

One sign that he had grown up was that he was given a name. It was really a nickname, given for something he had done. This name he had to bear all his life, so he was very careful not to do anything foolish or cowardly. If he did something brave and got such a name as Eagle-Heart, he was so proud he couldn't sleep the first night. The Indian man was proud and brave and cunning. Sometimes he was cruel. No man could use him for a slave.

If Eagle-Heart's sister was a merry little maid she might be called Laughing-Water. Isn't that a pretty name? Laughing-Water had lessons to learn too. She had to help her mother take the skins from the wild animals the hunters brought home, and cut up and cook the meat. She had to help scrape the hair from deerskins with sharp clam shells, and rub and pull the skin until it was as soft as a kid glove. A needle she made of a fish bone; for thread she used the leg tendons of the deer. Her thread was like our violin strings. It was very strong. Then she sewed the skins into shirts and leggings and moccasins and robes. She embroidered moccasins and belts with little shells, after boring holes through them; and she colored porcupine quills and arranged them in patterns on the soft yellow skin. She colored long eagle feathers and made a warrior head-dress for her father. She made herself necklaces of shells.

In the summer, the Indian women and girls dug holes in the fields, with pointed sticks or clam shells, and planted corn and beans, pumpkins and tobacco. Laughing-Water had to gather the ripe corn, shell it, boil the grains in clay pots, dry them and pound them to meal in wooden bowls. She sifted the meal through a sieve she made of fine tough grass. She wove baskets of reeds and grasses. If she had time she wove colored figures and lines in her pretty baskets. She made clay cooking pots and water jars, and she painted figures on them. One of the nicest things she did was to make candy. She made it by boiling the sweet sap of the maple tree. For her father, Laughing-Water dried the broad tobacco leaves. He put these in a pipe with a stone bowl and a hollow reed stem, and smoked them.

In the evening the whole tribe sat around a big fire under the maple trees. The tired hunters smoked and talked of the hunt, or of battles, and old men and women told stories of long ago.



INDIGO. For centuries the much prized blue dye called indigo was obtained exclusively from the indigo plant, and the indigo trade with India and other centers of production was flourishing and prosperous. Today the natural indigo trade has dwindled to a fraction of its former importance as the result of the discovery of means of making artificial indigo.

The story of artificial indigo is one of the most interesting in the history of chemistry. It took 17 years of tireless experiment and the expenditure of nearly $5,000,000 to perfect the process. As early as 1880 a German chemist, Adolph Baeyer, produced synthetic indigo from coal-tar products, but the cost of production was much greater than that of the natural dye. From then until 1897 he and others worked on the problem of making indigo by less expensive processes, and finally succeeded in producing it at less than half the cost of the plant dye. There is still a steady demand for the natural indigo, however, from manufacturers of textile goods who desire a "fast" blue of certain tints. (*See* Dyes.)

Vegetable indigo is obtained from a shrubby plant three to five feet high, with rounded leaves and pale-red flowers, belonging to the bean family. When three months old and in blossom, the plants are cut down, but soon shoot up again, and yield a second and often a third cutting in one year. The cut stems and leaves are crushed and soaked in water for several hours. Fermentation takes place. Then the water, which is clear yellow, is run off into another vat and stirred. Indigo begins to form in flakes on contact with the air and settles to the bottom. It is filtered through linen, molded into small cakes, and dried.

The best quality comes from Bengal. Indigo plants are also grown in Java, China, Ceylon, Mexico, Brazil, and Central America, and for a time there were extensive plantations in South Carolina and other southern states. Scientific name of Bengal indigo plant, *Indigofera sumatrana.*

INDO-CHINA. "Farther India," or "Indo-China"—the great projection which forms the southeastern corner of Asia—looks on a political map somewhat like a flower with three petals, supported on the slender stem of the Malay Peninsula. The western petal is Burma, an English colony adjoining India; in the center is Siam, which alone of the group retains its ancient independence; and French Indo-China in the east forms the third division. Siam also includes the upper part of the "stem," in the lower portion of which are the Federated Malay States, under the protection of Great Britain, and the Straits Settlements, a British colony. (*See* Burma; Malay Peninsula; Siam.)

Lying between India and China, Indo-China has something of the nature of each of these two great countries of southeastern Asia. The people, originally of Chinese stock, have derived their religion and much of their language from the Hindus, and are really a composite of both races. The more primitive Malays, who inhabit the narrow peninsula, have also had their share in creating the complex physical and social characteristics of the Indo-Chinese race.

French Indo-China, with its five provinces, Tonkin, Anam, Cochin China, Laos, and Cambodia, looks out over the China Sea, where the typhoon is born. At least 80 per cent of its 17,000,000 people are Anamese. Shorter than the Chinese and darker, the Anamese has a low forehead, small flat nose, and eyes rarely oblique. He is peace-loving and more industrious than the wilder Lao, who lives in the mountains, but is not so hardworking as the Chinese, who has so largely influenced his written and spoken language, his religion (a rather vague sort of Buddhism mixed with ancestor worship), and his dress—wide trousers, a long black tunic, a colored turban or a wide straw hat, and sandals or bare feet. His house is a one-room affair, with a veranda in front where the altar to his ancestors stands. In the daytime it has only three walls, but at night a bamboo partition let down from the roof shuts out a little of the night dampness of this semi-tropical climate. He grows two crops of rice a year, a little tea and tobacco, mines some gold and tin in the hills; in his forests he gathers saps which give him the pretty colors of his native cloths, tree-fiber from which he makes paper, and herbs and roots which with fish and rice make up most of his daily ration.

The French, who began their conquest in 1787, have not made much change in this picture of the life of the native, except in the capital cities, such as Hanoi (110,000) of Tonkin, Pnompenh (85,000) of Cambodia, Saigon (65,000), of Cochin-China, and Hué (60,000) of Annam, and the large cities of Cholon (191,000) and Binh-Dinh (75,000). Cambodia became a French protectorate in 1863, Tonkin and Annam in 1884, and Laos in 1893. Cochin-China has been a French colony since 1867. In 1887 it was united with the protectorates to form the customs union of French Indo-China. The government is administered by a Governor-General, responsible to Paris, and a Superior Council. Hanoi is the seat of government for the union.

The area of French Indo-China, variously estimated at from 256,000 to 308,000 square miles, is about that of Kansas, Nebraska, and the two Dakotas combined. Its two great rivers are the Red and the Mekong. Its imports, mostly from France and free of duty, are machinery, cotton and silk goods, tobacco, tin, and iron and steel; its chief export is rice and other exports are sugar, fish, pepper, coal, cotton, hides, and rubber. Railway lines carry merchandise between the main centers and are supplemented by trains of pack mules to reach the mountain and back country area.

INDUS RIVER. Glacier-born amid the wind-swept wastes of Tibet, this mighty river of India rushes for the first 500 miles of its 2,000-mile journey through an array of majestic Himalayan peaks of unequaled grandeur. After flowing northwestwardly through Kashmir it bends to the southwest and presently emerges into the great Indian plain of the Punjab, the "land of the five rivers," which the Indus and its tributaries water abundantly.

The united flood of the six rivers now sweeps on through Sind plain—a region which is the creation of the Indus as Egypt is the creation of the Nile. The climate here is almost rainless, but thanks to the annual inundation of the great river, when the melting snows of the Himalayas cause it to burst its banks, and to an intricate network of canals, all this region produces abundant crops of cotton, millet, rice, and wheat. Even the soil is the gift of the river, which carries the fine sand and clay of its upper course to the Sind plain and deposits the silt there as it slackens its impetuous course. So abundant is this accumulation that the Indus has raised its bed 70 feet above the level of the plain at its border 50 miles away.

In the lower part of its course, except where it runs between walls of rock, the river continually shifts its bed, especially in the 130-mile delta, through which it finds outlet to the Indian Ocean by means of a great number of little channels. Hence there is little navigation, except by the high-sterned flat native boats. Fish are abundant and crocodiles and alligators infest the lower reaches. Many bridges cross the river, of all types from modern steel suspension railway bridges to the swaying rope and vine bridges of the mountaineers.

INDUSTRIAL REVOLUTION. Until about 1750 the world carried on its daily work in much the same way that it had done for more than 2,000 years, and a contemporary of Pericles would have had little difficulty in making himself at home in the England of George III. Plows were still clumsy wooden affairs that did little more than scratch the ground; reaping was done by hand with sickles and scythes; jointed sticks called "flails" were used for threshing the grain. The tools of the carpenter, smith, and mason resembled those shown on the old Egyptian monuments; and except for the hand- or foot-driven spinning wheel, spinning and weaving showed little progress since the Homeric days when Penelope wove her web by day and unraveled it again in the secrecy of the night.

We may sum it all up by saying that there were no *machines* before 1750, such as now perform most of man's work for him and place at the disposal of every one goods which only the wealthy could formerly buy. On the other hand there were no smoke-blackened factory towns with their squalor and desolation; and problems of unemployment, of capital and labor were few or unknown. It is to the changes which, within less than a hundred years, wiped out this age-long condition of affairs and brought about the throbbing, pressing, machine age of today, that we give the name Industrial Revolution.

The movement began first in Great Britain and it has gradually spread over the world. In agriculture it came first with better tools and methods of cultivation, particularly the growing of root crops—turnips and beets—in rotation with grain. Breeds of cattle and sheep were improved, and draining and fertilization made the land more productive and capable of supporting a larger population (*see* Agriculture). At the same time roads were improved and canals were built for transporting heavy commodities.

Then about 1750 began the great movement growing out of the new machines for spinning and weaving (*see* Spinning and Weaving). These brought the factory system and the application of water and steam power to manufacturing—with the long train of inventions which have made the steam engine more and more a thing of wonder, until it became the thundering locomotive dragging its train at 60 miles an hour across continents only a few score years removed from savagery. And machine has followed machine, of ever growing wonder and complexity, until now it is calculated that in the textile industries alone the work of these non-human slaves who serve us equals that of 50 billion persons working with the old hand tools!

Production has thus increased enormously, and with it the population of the earth. The whole world has become a single industrial state; cities have grown to gigantic size as compared with the country; the rich have grown richer, but alas! the poor in many cases have become poorer; and education and information have spread broadcast, until a flood of democracy has everywhere crumpled the ramparts of kings.

No period since the world began has seen changes which can begin to compare in importance with these. Is it any wonder, then, that competent historians have called the Industrial Revolution "the greatest single event in the world's history"! (*See* Inventions.)

INITIATIVE, REFERENDUM, AND RECALL. The constitution makers of the early United States distrusted the ability of the people to govern themselves directly, and so introduced a system of checks and balances, and indirect government through elected representative assemblies holding office for a definite period. The acts of Congress and legislatures were subject not only to the veto of the president or governor, but to review by courts appointed generally for life. Times have changed since then, and today the people seek to curb somewhat the authority of their representatives. Three of the modern weapons in the fight to place more direct power in the hands of the people are the initiative, referendum, and recall.

The first two are methods of controlling the law-making body. Your Latin will tell you the meaning of the terms: initiative from *initio*, meaning "begin," and referendum from *refero*, "carry back." The initiative then is the means by which the people may begin making a law, and the referendum the means by which they may act upon a law already passed by the legislature.

Of these two the referendum is the older. It was in use in some of the Swiss cantons as early as the 16th century. When the United States was formed three of the new state constitutions were referred to the people for their approval; and by 1820 the referendum on constitutional questions was generally in use in this country. Some important local matters, such as changing the boundaries of counties, locating county

seats, the borrowing of large sums of money, etc., were also submitted to the people of the locality interested, even in colonial times. But it was not until 1898 that the referendum for any law passed by the legislature was authorized by a state in the Union. In that year South Dakota passed such a law and since that year many other states have followed her example. Under the referendum if anyone thinks a law passed by the legislature is bad, he can within a given time sign his name to a petition asking that the law be referred to the people. He then circulates the petition among his fellow-citizens and if a certain number or a certain percentage of the voters affix their names, the question is submitted at an election and the majority of voters decide it by an answer, yes or no.

The referendum led to the initiative both in Switzerland and in the United States. If the people were capable of deciding whether a law passed by their representatives was good or bad, why were they not capable of originating laws which were needed? Oregon under the leadership of William U'Ren, a lawyer and reformer, began the movement in America in 1902 and the "Oregon plan" for the initiative and referendum has been followed by other states. That commonwealth not only gives the people a share in legislation but it also educates the voters by sending out pamphlets containing the laws to be voted on and arguments for and against them. The details of the initiative laws, like those in the referendum, differ in different states. In some the bill is placed on the ballot immediately after the petition is filed. In others it must be submitted to the legislature and then, if that body refuses to act, it may be submitted to the people.

The recall has to do with the control of officials rather than of legislation. It is a method of removing from office before the end of their term men who have proved unsatisfactory. The usual way of accomplishing this is to hold a new election if a certain per cent of the voters ask for the recall of an official. If, in this new election, the old officer receives the highest number of votes he remains in office. If not he is "recalled," or removed, and the man who did have the highest number takes his place. The recall is, as Woodrow Wilson once said, rather "a gun behind the door" with which to threaten officials than a weapon for ordinary use.

INK. If the ink runs smooth and free from your pen, sinks into the paper without spreading, and leaves a blue-black mark that becomes deeper and deeper in color, even if it is exposed to the sun's rays, it is probable that it was made of nut-galls, from which, for centuries past, the best grades of ink have been made.

The nut-galls used are growths of a species of oak found in Asia Minor. The gall-fly, a small wasplike insect, burrows into the soft twigs and deposits her eggs. The tree throws protective tissues over the spot until a lump, sometimes nearly an inch in diameter, is formed. These lumps, or nut-galls, contain a large amount of tannin, the substance which makes them so valuable for ink making.

Solutions of the nut-galls and an iron salt, usually green vitriol, are mixed, and a chemical change occurs, forming the color. A thickening substance, often mucilage (gum senegal), holds this color suspended in solution. Small quantities of various acids keep the ink from coagulating and molding. Often other coloring agents are added to make the writing darker in color at first.

If you are using an inferior grade of ink, it may have been made of logwood from the West Indies, or by mixing green vitriol with other tannin solutions. Such inks, while they may be satisfactory at first, fade out after a few years. Some ancient documents written with ink made of nut-galls are as bright and clear today as when they were written, centuries ago; while inferior ink fades in a few years.

How Fountain Pen Ink is Made

If you are writing with a fountain pen, the ink you are using was made probably from the black aniline dye, nigrosin. This makes a brilliant blue line, and because it never thickens and no sediment forms, it is peculiarly adapted to the fountain pen, although the color is not so permanent. All colors of ink can be made with aniline dyes.

Red ink is sometimes colored with the powdered bodies of thousands of tiny red insects, called cochineal, brushed from the cactus in Mexico, Central America, and Peru. Other red inks are made from brazilwood, imported from Central and South America; while not producing such a brilliant scarlet as cochineal, these inks do not fade so quickly.

Then there are the secret or "sympathetic" inks, which leave no visible mark on the paper when they are used. Many important papers have slipped past an enemy's eyes by this means, to reveal their messages when they have reached their destinations. Some of the favorite secret inks are lead acetate solution, whose invisible marks turn black upon exposure to sulphureted hydrogen; cobalt nitrate solution, which turns blue when it is treated with oxalic acid; and cobalt chloride or nitrochloride, which becomes green when heated. During the Indian Mutiny letters and orders were sometimes written with rice water, to be developed later with iodine. A clean pen dipped in lemon juice will produce writing which is invisible when dry, but which stands out sharply in brown when the paper is heated.

"India Ink" from the Orient

Artists use India ink. This is an early form of ink invented in China 1200 years before the Christian era, and the best qualities are still made in China and Japan. Lampblack, made from sesamum oil, is mixed into a paste with a glue made from asses' or oxen's skins, and then pressed into sticks or molds.

The most interesting ink of all, perhaps, is sepia, obtained from the cuttlefish or squid. This most uncanny of sea creatures has on the under side of its

body a gland containing a deep brown fluid, which it can throw out at will to conceal its escape when it is alarmed. Sepia ink, the most lasting of natural inks, is made from this fluid.

Copying inks are ordinary inks made with less water and a larger amount of pigment and a substance (gum arabic, glycerin, etc.) which will retard the oxidizing effect of the air. Printing inks are quite unlike writing inks, for they are gummy, adhesive substances. In the "fountains" of the printing presses this ink looks like heavy black or colored pitch, and the oils contained in it give it a distinctive though pleasant smell. A good printing ink must fulfill many requirements. It must distribute freely over the roller, spread sharp and clear over the type, and come off easily from the type to the paper. The best printing inks are mixtures of carbon black or gas black and linseed oil, although with the increasing cost of linseed oil some form of rosin oil is generally used as well. Common soap is also an ingredient. Gas black is made by burning gas flames in a scanty supply of air. The flames are thrown against metal slabs or into revolving cylinders, and the soot that accumulates is scraped off and ground.

Inks were used by the Egyptians and the Chinese more than 2,500 years B. C. While the exact character of these inks is not known, they were probably simple mixtures of powdered charcoal and glue. The Romans used sepia as a writing fluid. Iron-gall inks, however, seem to have been first compounded about the 11th century. From that time forward these inks gradually replaced other inks. In those early days they were usually mixed by the writers themselves, and recipes for their preparation were circulated between households, much as cooking recipes are exchanged today. The scientific preparation of standard writing fluids did not begin until the middle of the 18th century.

INNOCENT, POPES. Of the 13 popes who have borne this name INNOCENT I was in office from 402 to 417, and is chiefly remembered because of Alaric's sack of Rome, in 410. But he was an able and energetic pontiff and lost no opportunity of asserting the papal power. INNOCENT II (Pope, 1130–1143) supported the great scholar Abelard against his opponents.

INNOCENT III (Pope, 1198–1216) was in many respects the ablest and most powerful pope of the Middle Ages. His lofty and severe character inspired universal respect. He greatly strengthened the temporal power of the papacy, for in addition to the Papal States, which he ruled in Italy, he had as vassal states under him Sicily and Naples, Sweden, Denmark, Portugal, Aragon, and Poland. It was to him that King John surrendered England, receiving it back from the pope's legate as a fief. He also put in practice the papal claim to set up and pull down emperors of the Holy Roman Empire, in the case of Philip of Swabia and Otto IV. While he was pope occurred the Fourth Crusade and the Latin conquest of Constantinople.

INNOCENT VII (1404–1406) was one of the Popes during the Great Schism of the Church. Under INNOCENT VIII (1484–1492) corruption reigned at Rome. INNOCENT X (1644–1655), INNOCENT XI (1676–1689), and INNOCENT XII (1691–1700) were all reforming popes, who combated heresy and sought to improve the Roman administration. The others require no separate mention.

INQUISITION. To check the waves of heresy that swept over Europe in the 13th century, the Church of Rome established a special tribunal called the Inquisition to try persons accused of revolting against religious authority. Up to that time heresy trials had been conducted by the local bishops. The new Inquisition courts, which soon were put in the hands of the Dominican friars, were able to carry forward the work on a broader scale.

Arriving in a district, the judges, aided by the local bishop and the state authorities, would announce 30 days' grace for all heretics to come in and confess their crime. When that period was up the trial of the accused and unrepentant ones began. The names of witnesses were kept secret, but the defendant was permitted to submit a list of enemies, and none of these might appear against him. Following the frequent practice of the period in criminal trials, torture was often used to force confessions of guilt.

At a grand ceremonial, called *sermo generalis* or *auto-da-fé*, the names of the guilty were announced and punishments inflicted, ranging from fines and excommunication to imprisonment for life or burning at the stake for incorrigible heretics. Since canon law forbade the clergy to participate in bloodshed, the severer penalties were carried out by the state.

The Inquisition reached its height in Spain during the days of King Ferdinand and Queen Isabella, when Fray Tomás de Torquemada (1420–1498) was made inquisitor general for the kingdom. Here the crown exercised almost complete control over the Inquisition and carried it to extremes, often coming in conflict with the authorities at Rome.

The Inquisition was sometimes used as a cloak for political and private revenge, and at times the sincerest inquisitors were misled by fanatical zeal and practiced great cruelties. But on the whole, the institution was a logical product of its time. In those days the church and state were united in the closest bonds, and heresy was considered a crime against both, to be compared only with high treason and anarchy. To the people of the period it seemed as reasonable to punish a man who "plotted against the life of the church," as it would in our day to punish a man who plotted against the existing government.

The Inquisition was chiefly active in southern Europe, and continued in modified form in Spain until 1820. The Congregation of the Holy Office, established by Pope Paul III in 1542 to review the judgments of the Inquisition courts, still exists. It examines charges of heresy, but imposes only spiritual punishments such as excommunication.



The SIX-LEGGED CREATURES of AIR, LAND, and WATER

HERE you will read the story of the eternal warfare going on around us between the countless millions of the insect world. You will learn how they get their food, fight their battles, and protect their young, and also something about the magic that puts wings on the caterpillar, and turns the helpless grub into the busy bee.

INSECTS. When you open the gates of insect land, the first thing to startle you is the amazing number of the inhabitants. If you could count all the men in the world, all the four-footed animals, all the birds, all the fish in the rivers and oceans, the total would be small and insignificant compared to the number of insects.

If you could put all the insects on one side of a huge scale, and all remaining land animals, including men, on the other, the insects, small as each of them is, would weigh down the scale.

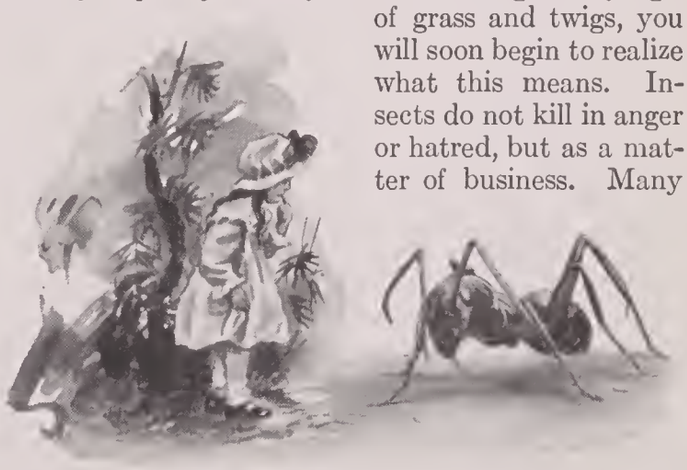
Whenever men have tried, for any reason, to calculate insects by numbers, they have reached sums so staggering that the human mind fails to grasp them. For instance, on the island of Cyprus in the Mediterranean, during a fight against the locust plague, 1300 tons of locust eggs were destroyed in one year. Yet the next year it was estimated that the locusts which survived laid, on that island alone, 4,000 tons of eggs—making the enormous total of 100 billion individual eggs. And yet these figures represent only one particular species of insect in one tiny corner of the earth. And there are in the world at least one million different species of insects.

Everywhere that there is life these six-legged creatures thrive and multiply—flying, creeping, burrowing. Most people pay little attention to them, except when they are bitten or otherwise bothered by some of the bolder members. Yet insect habits and history are stranger than the weirdest tales of fairyland.

Imagine yourself a pigmy one inch high pushing out into the insect world to learn their customs at close range. You would need to have, of course, some magic password to insure your safety, or you would be killed within an hour. You would learn as your first lesson that in insect land "might is right." Death lurks at every corner. Each hole in the ground or hollow beneath a stone may hide some nightmare monster with yawning jaws waiting for his prey. A dead leaf may conceal a hungry dragon who will pounce upon you as you pass. Or some flying creature may swoop down out of the air to deliver the fatal blow. Murderous warfare goes on night and day on all sides.

Perhaps some wise old ant hurrying by will tell you the answer to this tragic riddle: "To eat without being eaten is the first law of insect land. And the second law is to lay eggs and provide for the young. There are no other laws but these."

As you pick your way forward through the jungle of grass and twigs, you will soon begin to realize what this means. Insects do not kill in anger or hatred, but as a matter of business. Many



"To eat without being eaten is the first law of insect land. And the second law is to lay eggs and provide for the young. There are no other laws but these."

THE TOOLS OF THEIR TRADES



Like human workmen the busy little people of the insect world have different tools for different purposes. The first picture on the left at the top shows, much magnified, the mandibles of the Stag Beetle. Next are the "scissors" with which the Leaf Cutter Bee does such neat work. On the right are the powerful pincers with which the Wood Ant fights and works. The central picture shows the saws of the Sawyer Beetle, while below we see the picturesque countenance and the hungry jaws of the Green Tiger Beetle.

more million individuals are born every minute than there is room for. Each must struggle hard for existence and in the struggle more go down than live. Brief as the natural lives of most insects are, not one in a million dies of old age. They fall in war or at their work, or by disease, or by the rigors of climate.

War and work! That's the most of an insect's life. Born with a tremendous hunger, he must start at once to labor and fight to satisfy it. And when he is grown he must turn in and work for the next generation as fast and as hard as he can. Except for this constant struggle insects would soon multiply so rapidly that they would fill the whole earth.

If you can move your two legs fast enough to keep up with the six legs of the ant, you may learn, as you travel together more about the strange customs and history of its fellow insects.

"Always remember," the ant will say, "that in our land everything can be traced back to those two laws. All the shapes and colors of insects, that seem so horrible or beautiful to you, are not accidents. They all mean something in our struggle to live.

"Since there are so many of us, we have had to learn to eat almost anything in the world. Anything that's alive, or has ever been alive, is food for one kind of insect or another. There are some even that live on wooden furniture, old shoes, and the paper in books —they've learned to do that since you men started making such things. Others, such as fleas, mosquitoes, and certain flies, feed on living men and animals. Still others clean up dead vegetable and animal matter they find lying around.

"But by far the greater number of us feed upon living plants or upon each other. The caterpillar eats the leaf, the young wasp eats the caterpillar, the beetle eats the young wasp, the bird eats the beetle. Then, when the bird dies in some forest tragedy, another beetle comes along and buries him, and the little beetles eat a part of his body, the rest stays in the ground and makes it rich so that another tree can grow whose leaves another caterpillar will eat. That's the way it goes, always in a circle; one dies so another can live. After all, it isn't the individual that counts, it's the race."

When the wise ant says this, you may perhaps remember the line in one of Tennyson's poems, in which he says of Nature: "So careful of the type she seems, so careless of the single life." The ant continues:

"The character of an insect's mouth-parts depends on what he eats. Some have strong jaws to tear leaves or bite the bark of trees or gnaw each other. Some have a sucking apparatus to draw in honey or fruit juices. Some have tiny pointed beaks to pierce the skin of plants or of animals whose blood they drink. Indeed, the mechanisms with which insects get their food are much superior to men's mouths.

"The manner of our life also influences our feet and legs. Some of us have sharp claws for climbing or clinging to the bottom of a leaf, while others have sucker-like hairs on their feet for hanging upside-down on smooth surfaces. Others still have broad flat feet for digging, or huge front legs with great talons for seizing and holding living prey, like that great hypocrite, the praying mantis."

THE CYCLE OF LIFE AND DEATH IN THE FOREST



"The caterpillar eats the leaf, the young wasp eats the caterpillar, the beetle eats the young wasp, the bird eats the beetle. Then, when the bird dies in some forest tragedy, another beetle comes along and buries him, and his remains make the ground rich so that another tree can grow whose leaves another caterpillar will eat."

contained in the Easy Reference Fact-Index at the end of this work

Here the old ant stops and holds up its own front feet. "I'm a runner and a climber too, you see. I'm made for work. But my queen," it says, bowing its head at the name, "has wings and can fly like the great majority of insects."



INSECT STYLES IN FOOTWEAR

The Mole Cricket is the greatest digger for his size in the world. Look at his front foot and you'll see why. With those powerful claws he cuts and scrapes through the earth, scooping it back with that strong broad "palm." That slit at the top of the foot is the Mole Cricket's ear.



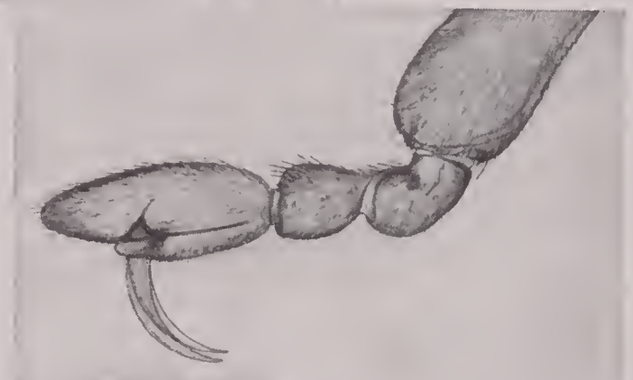
"All insect tribes that are alive today," it continues, "have survived because they have some special tricks for avoiding destruction. And these tricks all follow one or more of four systems—numbers, concealment, armor and weapons, and what we may call 'frightfulness', which is another name for bluff.

"The number system is simple. It consists in laying eggs and bringing up children faster than all our enemies put together can eat up. This method is used more or less by all insects, but particularly by such helpless creatures as the scale insects. Fruit growers have found how hard it is to kill these off. You can destroy ten millions of them, but if one escapes, there'll be millions more born inside of a month.

"The concealment method is far more clever. Some insects are positive geniuses at it. The leaf-insect imitates the color and shape of a leaf so skilfully that his own brothers, who are strictly vegetarians, sometimes bite him by mistake. There's a butterfly also that does the same thing, imitating even the stem which attaches the leaf to the twig. This is what you now call 'camouflage'—but it's a very ancient science among insects. Some of us imitate a stick of wood, or the bark of a tree, or a flower blossom. The system works best of all in fooling our two-legged enemies—birds and men—who look for us from a distance.

"But what will interest you most is the armor and weapons we use in protecting ourselves against our enemies. Just feel my back a second," says the ant, stopping short. "Do you see how tough, and smooth, and springy it is? And the top of my head, too, is covered with the same kind of tough, horny skin. That's made of stuff you call *chitin*. Every insect has more or less of it on his body. The beetles are particularly well protected by it. With many of them it amounts to a solid shell of armor that will turn the sharpest pair of jaws in insect land. The only places on a beetle where I ever could get a hold were at his knees and elbows, or in the soft joints of his stomach. Some beetles can draw their heads and legs close in and laugh at any small bird that tries to pick through their thick shells. Besides protecting us, this chitin covering takes the place of a bone skeleton, such as you have, and helps us to hold our shape.

"As for our weapons, our jaws, of course, are very effective against enemies who are near our own size. For larger foes, insects have a wide assortment of sharp beaks and poison stings, with which they can inflict painful wounds on the biggest of creatures. The wasps and the bees are the best all-around single-handed fighters. But when it comes to organized warfare, with army formations, massed attack or defense, and all the details of strategy and tactics, together with patriotic courage, the reputation of the ant family speaks for itself." There is a certain note of pride in the old ant's voice as it says this.





Just below the Mole Cricket's foot we see the stag beetle's double claw. The third picture shows the foot of the Ditch Skater that flits over the water of ponds and ditches. The hook is for holding to water plants or to its prey. A fourth picture shows the foot of the Scorpion Fly, which has long spiny legs and grasping claws for clinging tight to its victim.

"The real joke, though," the ant continues, "is the way insect frightfulness or bluff works. You know how the common earwig frightens you men when he

CAMOUFLAGE AMONG THE SIX-FOOTED CREATURES



First, a Willow Beauty Moth blending with the bark of a willow tree. Next, two Indian Leaf Butterflies, one with wings open, the other folded. Third, a Lappet Moth, another leaf imitator. Last, a Walking Leaf Insect, probably the best mimic of all. He even fools his relatives.

curls up that terrible-looking tail of his with its snapping pincers? That's bluff, pure and simple. He couldn't possibly hurt anything with that, yet many an earwig owes his life to the terror he inspires.

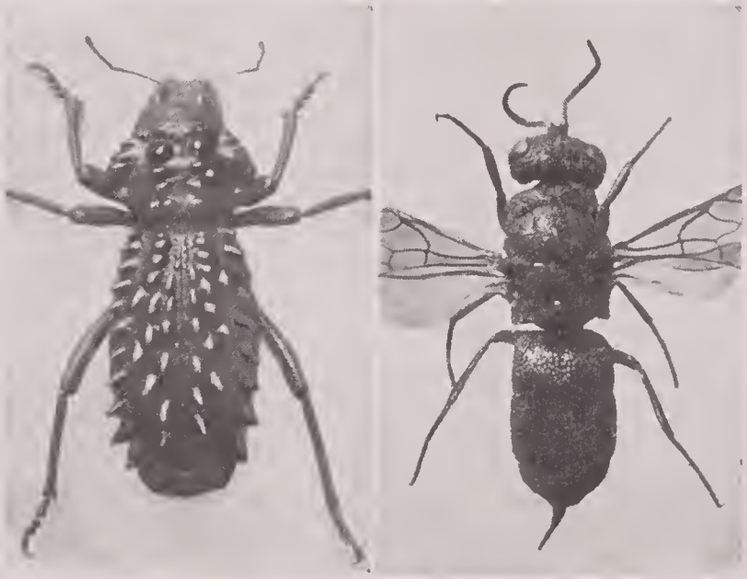
"The stag beetle and the rhinoceros beetle look so fierce with their huge horns that they scare other insects and even birds away. But if you should put your finger between the stag beetle's big pincers, he wouldn't know what to do. He certainly can't pinch hard enough to do any harm. There are dozens of examples of such frightfulness. Some harmless insects even imitate the shape and color of the stinging kind and so escape. Certain flies, for instance, mimic bees.

"Did you ever hear of the bombardier beetle? He's the real inventor of the poison-gas artillery. When a larger beetle or a bird pursues him, he fires a little cannon he carries on his tail. It goes off with a 'pop' and forms a little cloud of blinding gas, which covers his escape. The puss-moth caterpillar can also squirt out poison clouds.

"But if we have a lot of bluffers, we have also some really dangerous characters in insect land, which attack even four-footed animals and kill them single-handed. There is a huge African locust which catches and kills mice and small birds for food.



This little creature known as "Gray's Spiny Stick-Insect," looks so much like the thorny bushes on which it feeds that its enemies have trouble in finding it. It's nearly a foot long.



On the left is a species of Weevil whose "thorns" make him an unpleasant mouthful. On the right is the Ruby Wasp, which is protected by an extremely hard shell.

And if I had time, I'd show you in the lake over there how the giant water-bug can kill small frogs and fish, seizing them in his powerful front legs and plunging in his deadly beak. But I must get back to my work." And with these words the old ant hurries away.

In the Fairyland of Change

If the ant had had time he might have explained that wonderful feature of insect life we call *metamorphosis*. With very few exceptions, insects grow from eggs. Most species after hatching from the egg do not resemble their parents at all. They may be smooth wormlike creatures, such as the maggot of the bee or the fly, or they may be hairy like some caterpillars, or big fierce-looking grubs like the young of the tiger-beetle. At this period of its life, the insect is called a *larva*, and its only duty is to eat and grow. The period may last only a few days, as is the case with bees and flies, or it may extend over years, as in the case of the cicada or "17-year locust." This period may be spent burrowing in the ground, hiding in holes in the trunks of trees, swimming in the water, or crawling about in the open air—each according to its kind.

In due time, however, the insect enters the *pupa* stage or *chrysalis* stage (as it is called in the case of butterflies

and moths), which is a period of sleep. For this purpose many larvae, such as caterpillars, form a sort of silken cradle called a *cocoon*. During this sleep, the whole shape and structure of the pupa changes, and when it awakes and bursts out of its old skin, it has become for the first time a fully-developed insect (*imago*) like its parents. The ugly caterpillar, for instance, has turned into a handsome butterfly or a moth.

FORTIFIED CASTLES OF THE CADDIS FLIES



In their larval stage, the Caddis Flies live under water and cover their soft white bodies with silken tubes, to the outside of which they attach various materials—sand, twigs, bits of stone, and so on—as a means of protection. Different species have different protective materials, as shown in the illustration.

But there are many strange variations and exceptions to this law of metamorphosis. Some insects, like the oil beetles, pass through two or more larval forms before they become pupae, and the mayflies undergo an additional change after they leave the pupa stage. There are, on the other hand, many groups of insects, such as the grasshoppers, locusts, crickets, and all true bugs, in which the young resemble the parents just as soon as they hatch from the eggs, needing only to grow larger, and to develop wings, if they are of the winged kind. Such young insects are called *nymphs* and not larvae. During the growing period, nymphs shed their skins several times. This is necessary because the chitin covering of an insect cannot stretch.

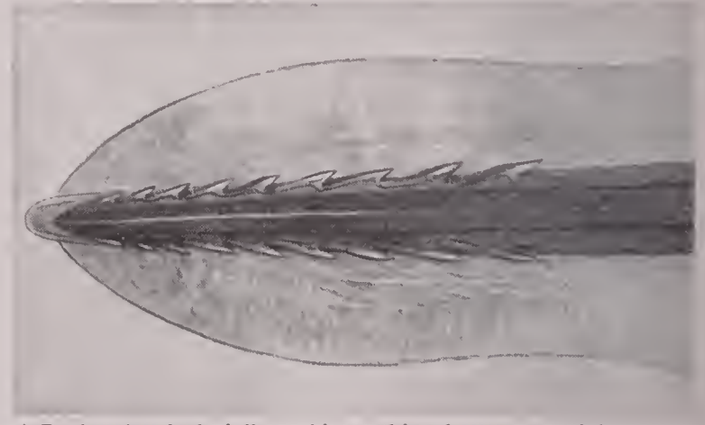
There are exceptions also to the egg stage, for the young of some insects are born alive. Such insects are called *viviparous* (Latin *vivus*, "alive," and *pario*, "bring forth"), to distinguish them from egg-laying insects, which are called *oviparous* (Latin *ovum*, "egg"). Plant lice or aphids have the curious habit of sometimes laying eggs and sometimes producing living young. These tiny green creatures also illustrate the practice, not uncommon among insects, in which the females bear young for many generations without the males. This is called *parthenogenesis* (from the Greek words meaning "virgin birth"). Furthermore, there are insects which produce young while still in the larval stage, and others while still in the chrysalis or pupa stage.

The social groups of insects—ants, wasps, and bees—rank highest in intelligence. These have learned the lesson of coöperation, which reduces the struggle for existence to its easiest terms. With them, the spirit of the hive or nest rules supreme over the willing workers. From the earliest times, men have found inspiration to devotion and self-sacrifice in the lives of these ingenious insects. (*See* Ant; Bee.)

In general, it is in the nest-building habits of insects that their highest skill is shown, rivaling many of man's cleverest accomplishments. The carpenter bee, for instance, bores into the solid wood and builds cells for its eggs. The mason wasp constructs a beautiful home of mud. There are spinners of silk and makers of wax, upholsterers, workers in wood pulp and tree gums, and hundreds of other special trades and professions represented in the insect world.

Most of these nest builders store up food for their young. It may be honey, or pollen, or the bodies of other insects killed for this purpose. Some wasps even store up living insects, after paralyzing them with their stings, so that their young may have fresh food when they hatch from the egg.

THE SHARP "SWORD" OF THE BEE



A Bee's sting feels fully as big as this when you get it into your bare foot, but here it is much magnified of course. Those little barbs are what make it stick. Connected with this weapon is the poison gland which makes the sting hurt so.

What happens to insects in the winter time? Most of them die, leaving eggs or half-developed young to await the warmth of spring under ground or in some other protected place. In certain species, like the social wasps, the female sleeps through the cold weather and lays the eggs for the new generation as soon as warm weather comes. The colony life of ants and bees, however, continues all the year around.

How Insects are Made

The chief distinguishing feature of insects is that all of them have six legs, which gives them the scientific name *Hexapoda* (from the Greek *hex*, "six," and *podes*, "feet"). Their bodies are always divided up into segments or rings. There are a great many creatures which closely resemble insects and are often mistaken for them—for instance, spiders and scorpions, which have eight legs; centipedes, with dozens of legs; mites and ticks, which have sacklike bodies unbroken by segments.

Insects, however, belong to the larger group of creatures with jointed legs called *Arthropoda*. This includes not only centipedes, spiders and scorpions, but shrimps, crabs, and lobsters, as well.

The name "bug," which is often applied to insects in general, really belongs to certain special kinds of insects only. Among other peculiarities which distinguish the true bugs from other insects is the beak with which the members of this order suck the juices of plants as well as the blood of animals.

METAMORPHOSIS



Here are the egg, larva, and pupa of the Honey Bee, illustrating the three stages through which most insects pass before they become real "grown-ups."

The body of an insect is divided into three parts—head, fore-body or thorax, and hind-body or abdomen. The head bears the delicate feelers or antennae, the mouth parts, and the eyes. The sense of smell is situated in the antennae. There are two sorts of insect eyes, the large compound kind, made up of a great number of separate facets or lenses, and the simple eyes or *ocelli*. Many insects have both kinds, the ocelli being situated between the two prominent compound eyes. In certain mosquitoes and gnats the ears are found in the antennae, but in most insects they are not on the head at all, but between skin-layers on the body. Crickets and grasshoppers have ears on the shins of their fore legs.

The mouths of insects are supplied usually with *mandibles*, or pinching jaws, and *maxillae*, or biting and chewing jaws. The size, shape, and arrangement of these mouth parts vary greatly in different species. In the true bugs, it is the mandibles which are modified into sucking beaks.

The thorax bears the three pairs of legs and the wings, when these are present. The typical insect has four wings, but in many species, such as the housefly, they are reduced to two, and in many others they have disappeared altogether. In some insect groups, the males only have wings, in others only the females. Certain species, like the plant lice, develop wings only under special conditions of diet or weather. Often, as in the beetle tribe, the front wings of insects have become armored wing-covers, which protect the delicate rear wings when the latter are not being used in flight.

The abdomen, consisting of several segments and joints, contains the digestive tract and in females the egg-laying apparatus or *ovipositor*. This is often very delicate and complicated, enabling the insect to bore into the ground, or into trees, or through the skins of other insects to lay its eggs. The poison sting, when present, is situated conveniently at the tip of the abdomen.

Insects have well-developed brains and nervous systems. A simple contracting heart-sack provides for the circulation of blood. They have no lungs and do not breathe through their mouths. Air is drawn in through tiny holes or *spiracles* in the body-segments, and passes through an intricate system of branching tubes or *tracheae*, carrying oxygen direct to all parts of the body.

The muscle system in insects is perhaps as delicate and complicated as in any higher animal. Scientists with microscopes have counted as many as 4,000 muscles in the body of one small caterpillar.

The collection and study of insects is fascinating and profitable work for old and young. Insects are best captured by using a butterfly-net. They may be killed

BUILT·FOR BATTLE



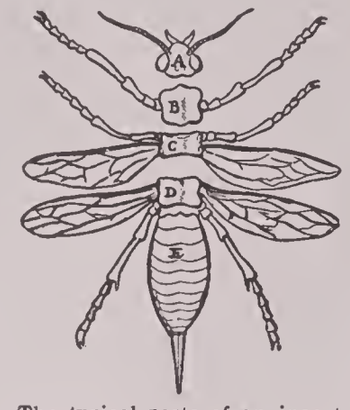
The Red-banded Sand Wasp with its long slender waist and its poison dart is one of the most skilful fighters of the Insect World.

without injury by dropping them in a glass jar filled with the fumes of benzine, alcohol, ether, chloroform, carbon disulphide, or potassium cyanide. Once they are dead, the insects should be spread out in their natural attitude on a soft board, and held in place with fine pins until they dry. They may then be mounted on long pins thrust through the thorax and into the bottom of a shallow box. When mounted, labels bearing the name of the specimen should be neatly pasted underneath. A small magnifying glass is a great aid to insect study.

About 300,000 species of insects have been collected, named and described by scientists. But by far the greater part of the insects which inhabit the world are still unknown to science. Hundreds of new species are discovered every year. Estimates of the probable number of species run from one to several million.

As a class, insects are found in virtually all parts of the earth, many species existing inside the Arctic circle. But insects flourish best in warm countries. In the tropical forests of Africa insects of every kind swarm in such numbers that, as the explorer Henry M. Stanley said: "There must be no sitting or lying down on this seething earth. Venom, fury, voracity, and activity breathes around you."

PARTS OF AN INSECT



The typical parts of an insect are shown: the head (A); the first joint of the thorax (B), bearing the front legs; the second joint (C), bearing middle legs and front wings; the third joint (D), bearing hind legs and second pair of wings; the abdomen (E), bearing the egg-laying apparatus and the sting when present.

From man's point of view, insects may be divided into the harmful and useful classes. Many kinds, like grasshoppers and locusts, plant lice, scale insects, cotton weevils, and the caterpillars of nearly all moths and butterflies do an immense amount of damage to trees, crops, domestic animals, and food stores, estimated for the United States at two billions of dollars annually. Others, such as cockroaches, flies, fleas, mosquitoes, and gnats, annoy men and animals and even spread some of the most dreaded diseases of mankind, such as malaria, yellow fever, and that frightful scourge, bubonic plague.

But there is another side to the story which is too often overlooked. If it were not for bees and other honey-seeking insects, which carry the fertilizing pollen from flower to flower, it would be almost impossible to raise many kinds of fruit and other crops. If it were not for the beetles and wasps and others, which destroy every year vast numbers of the harmful insects, our fields and gardens would be overrun with pests of all kinds. Many of the insects which burrow in the ground do a great work as cultivators, turning over and airing the soil. Countless scavenger insects help the bacteria in getting rid of refuse for us. On the whole, these friends of man go a long way toward paying off the debt of his insect enemies. Besides, certain insects manufacture substances of great value, such as silk, honey, wax, dyes, and shellac. Among all the insects, however, men have found only two kinds that could be domesticated with profit—the silk-worm and the honey bee.

Insects appeared on earth long before mammals, some scientists claiming to have found insect remains in Silurian rocks (*see* Geology). It is certain that the forests of the Coal Age contained many insects, some measuring two feet across the wings. From that time on, thanks to their rapid propagation and powers of concealment and defense, they have held their own against later forms, and today they are man's most formidable rival for mastery of the earth and its riches.

How Science Classifies the Insects

The classification of insects for scientific purposes varies as new species are discovered. The following list of orders is one recently approved by American entomologists, as the students of insect life are called; it is based largely upon the structure of the wings and mouth parts. For each order one or two type examples are given.

Order

I. *Thysanura*, no wings (examples are bristletails, spring-tails, fish moths).
II. *Ephemerida*, delicate wings, two adult stages (mayflies).
III. *Odonata*, four wings, aquatic larvae (dragon flies).
IV. *Plecoptera*, folding wings, breathing gills in the larvae (stoneflies).
V. *Isoptera*, four wings alike (termites or white ants).
VI. *Corrodentia* (book-lice, tiny insects living in books).
VII. *Mallophaga* (bird-lice, parasites often found on poultry).
VIII. *Euplexoptera*, rear wings delicate and folding up in complex manner beneath small wing-covers, some wingless (earwigs).
IX. *Orthoptera*, straight wings (grasshoppers, roaches, crickets).

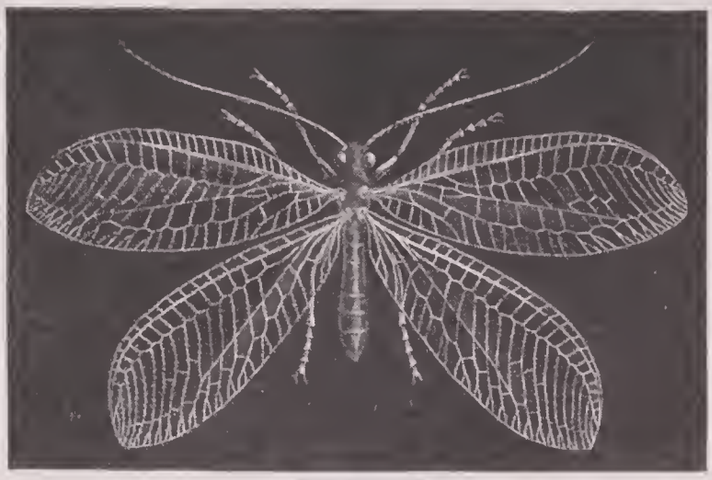
Order

X. *Physopoda* (thrips, tiny creatures usually inhabiting flowers).
XI. *Hemiptera*, piercing beaks (ordinary lice, water boatmen, cicadas, and all other true bugs).
XII. *Neuroptera* net-veined transparent wings, pupae free (ant lions, dobsons).
XIII. *Mecoptera*, (scorpion-flies, body shaped like scorpion).
XIV. *Trichoptera*, aquatic larvae, build movable houses of sticks or stones (caddis flies).
XV. *Lepidoptera*, scaly wings (butterflies and moths).
XVI. *Diptera*, two wings (common flies, gnats, mosquitoes).
XVII. *Siphonaptera*, piercing jaws, no wings (fleas).
XVIII. *Coleoptera*, sheath wings (all beetles).
XIX. *Hymenoptera*, four membranous wings (bees, wasps, ants).

For any subject not found in its alphabetical place see information

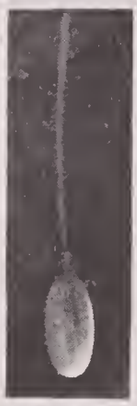
Some Mysteries of Insect Life

HAVE you ever thought, when you have watched an insect creep along a flower or leap into the air or disappear into the earth, that you are watching a mystery which no man who ever lived has yet been able to understand? This little insect, which you can crush out of existence with your finger, is as wonderful as the stars.



Sit in the twilight of some summer evening, and watch the winged procession of the lacewing flies that have been called the loveliest insects in the animal kingdom. The body of this fly is a pale emerald green; its lacelike, silvery wings are iridescent with lovely hues; its eyes are veritable living jewels, sparkling one moment like burnished gold, the next moment like rubies of deepest crimson.

We look up at it for a moment; we say to ourselves, "What a beautiful thing!" and it is gone. But there has flown past us in that moment a wonder that no man knows. That little lacewing fly will presently settle on a leaf, will press against it, and eject from its body a drop of sticky fluid. The drop of fluid rests upon the leaf, and out of it this little mother draws a thread almost too fine for us to see. The thread hardens in the air, and at the end of it, hanging in space, this little mother lays an egg. We go about our business, and the earth spins around seven times and then out of the egg at the end of the thread creeps a living thing. It creeps along the thread towards the leaf, and on the leaf is a giant—a creature twice as big as itself, an evil thing that eats up the life of roses and destroys our gardens. But the little stranger is not afraid. It has just come into the world and has never met a living thing before, but it grips this destroyer of roses, wrestles with it, crushes it, and in less than half an hour throws on one side the empty shrunken skin of its first victim.





It's easy to see from the upper picture how the Lacewing Flies get their name and why they have been called the loveliest of all insects. The center picture gives a magnified view of a Lacewing egg hanging from its tiny cable. The third picture is a magnified photograph of a Lacewing larva (on the left) attacking a Green Fly.

We need not claim this larva as a conqueror, nor attribute to it any virtue; it is enough to see what happens. Its first aphid gives it an appetite for more, and it creeps about destroying them until, by the time it is ten days old, it gobbles up 30 in an hour, and by the time it is 12 days old it will eat an aphid every minute. It is a cannibal, for it will suck the eggs of other lacewing flies—a fact which may explain why the mother lays her eggs at the end of a thread. Perhaps the little mother knows that her children will eat the eggs upon the leaf, but will not climb the thread. That is a difficult journey, the first journey of a lacewing larva in the world, and it goes that way only once.

At 12 days old the larva draws itself up like a ball on the edge of a leaf, spins something very much like a piece of delicate silk, and wraps itself up from the cold. In an hour or two it has changed into a round cocoon, like a pea, and on the edge of the leaf it lies still for 16 days. Then, from within, the little ball is opened, a round lid lifting, and out comes a lacewing fly.

"It is surprising," one naturalist tells us, "how so large an insect can develop in so small a cocoon, but immediately it appears upon the surface of the leaf its wings begin to shake out their folds, and a few minutes later we see the insect developing in all its charming hues. Its bright green body, its gauzy and iridescent wings, and its sparkling eyes — together with its abominable characteristic of producing a vile odor—have all been acquired in some mysterious way during the 16 days while it was crushed within its cocoon upon the leaf. How the magic was performed is a secret hidden deep within the pages of Nature's book."

It has taken five weeks to make this tiny creature: 7 days in the egg, 12 days—12 creeping, killing days—

as larva, and 16 days in the cocoon, where something happened which all the wisdom of the world has not been able to explain.

That is the tale of the lacewing fly. How many hours of summer days we have sat watching that other little fly, which fixes itself in a point in space and beats its wings so fast that it seems to be perfectly still, until suddenly it darts to another point not far away and rests there, seemingly still again, except that we know it has nothing to rest on, and is holding itself up by the marvelous beating of its wings! It is the hover-fly, one of the wonderful little beauties that make a garden in summer a marvelous place to be in. Out of the egg of the hover-fly creeps a tiny grub, as long as the 16th part of an inch, and with neither eyes to see nor legs to walk. Yet this blind and creeping thing has a strength that we can hardly believe. It travels down a stem, and by chance an aphid touches it. It cannot see, it has had no experience of the world, it has hardly begun to feel what it is to be alive; yet this tiny grub pounces on its prey, racing after it by means of the rough edges of its skin. This is what one observer writes of it as he has seen it happen:

"Instantly the grub thrust its head forward, and a moment later it was standing upright on the tail-end of its body with the aphid elevated in the air. In this attitude the little grub held the aphid for over an hour while it sucked its juices, and this in spite of the fact that its victim was much larger than itself, and continually struggling to escape. It then cast away the empty skin of the aphid, and rested for a while. During the first day of its existence it captured and ate two half-grown aphids and two smaller ones, and day by day, for ten days, its appetite increased in an astonishing manner."

Ten days pass away, ten days of hard feeding, and then this grub hangs to a leaf and stays there another ten days. Its skin is hardening as it hangs, and at last breaks, and out of it, shining in black and yellow bands, comes a little hover-fly.

One more peep at the wonder of insect life. We will take the hornet-moth, laying her little brown eggs on the bark of a tree. One day the caterpillar creeps out of the egg, and, instead of

THE HORNET-MOTH



Eggs of the Hornet-Moth



Larva eating into a branch



Looking out into the world



Now it has its wings

setting out in search of aphids, this little creature begins to burrow into the trunk of the tree, boring its way until it reaches the center where it eats a tunnel along the trunk several inches long, and widening as it lengthens. It has found its home. Here it grows and lives perhaps two years, never leaving its dark and narrow house, but taking care to guard itself against invaders by blocking the end of the tunnel with wood scrapings held together by silklike threads, spun by the caterpillar and woven with the wood to make a barrier. Thus guarded, the larva lives until it is full grown, and then, as if it were making up its mind, it turns around and faces its front door! It is as if this strange thing knew what was about to happen; and perhaps it does, for now that it has turned around it molts its skin and becomes a chrysalis. *Had it not turned before, it could not do so now,* for in its new coat, hard and brown, it could not possibly turn around in such a narrow space.

With its head toward the entrance of its tunnel, the chrysalis lies for perhaps four weeks. And what happens then we may let a well-known naturalist tell us. He is looking at the little hole in the bark of the tree, a neatly drilled hole just big enough to take an ordinary lead pencil!

"The sun's rays are falling directly into the hole, partly illuminating its interior, and while we are wondering what function the hole could serve we suddenly become aware of the fact that there is something moving inside it. What can it be? Some inquisitive insect, maybe, that has entered and is now returning.

"Presently the forepart of a shiny brown body appears, gradually advancing by little bunts as if pushed from behind, until at last it is distinctly protruding from the hole. Still it continues to advance, and just when we expect to see the curious object fall on the ground an extraordinary transformation scene takes place.

"The brown skin suddenly breaks open, and from it a wasplike insect with a black-and-yellow banded body crawls onto the bark. Its wings at first look soiled and crumpled, but in a few minutes they unfold from their creases, and the insect at once begins to travel up the branch, continuing

THE HUNGRY HOVER-FLY AND THE APHID PESTS



While the ant keeps the little green Aphids for dairy cows, the grub of the Hover-Fly prefers them in the form of beefsteak, as you can see from the picture on the left. The grub, only two days old, is killing a victim much larger than itself. The middle picture shows it dining on one Aphid, while another seems to be waiting its turn to be eaten. In the third picture, the Hover-Fly grub, after growing big and fat, has turned into a pupa.

until it reaches the cut end left by the woodman. There the hornet-like creature suns itself for an hour or more, looking decidedly dangerous even as it rests. When the sun is at its brightest the insect's feelers quiver excitedly, and then, with a beelike buzz, it takes to its wings."

This is not half the wonder of the hornet-moth, but then not half the wonder of anything in Nature has yet been told. There is no sign of intelligence, it may be said, in these strange things; but intelligence is in the order of the world, and the purpose of hover-flies and lacewing flies, we may guess, and a host of insects such as these, is to keep the balance of life so that we may live.



Here the Hover-Fly has just emerged from its pupa case and will now spend its time hovering in the sun, so justifying its name.

Hidden away in our gardens every winter, lying still and knowing nothing, is a vast army of creatures that no man can number. Through all these wonderful months they have lain there, in silence and darkness, while the great world has gone by and men and women and nations have lived their lives. And every year, in the dawning summer, this army bursts out into the sun. It is made up of the countless myriads of hover-flies from last year's cocoons, the last brood of larvae last year, too late to come to their full life then before the winter came, and kept in suspense until now.

This great army of little soldiers is one of the beneficent forces of the world. It finds, already waiting for it, a host of aphids which, if there were no conquering host to pounce upon it, would in a short time make life impossible for you and me and all other living things. In its few short weeks of life one single aphid may bring 6,000 million other aphids into life; and it was Professor Huxley, who did not exaggerate these things, who calculated that the descendants of one aphid if unchecked for only ten generations —that is to say, throughout one summer—would produce a bulk of matter equal in weight to all the living people on the earth!

Well, the lacewing flies and the hover-flies will be waking soon, and the aphids may look out. We shall go on our way, and most of us will think nothing about it; but, whether we know it or not, we may rest and be thankful, and sleep comfortably in our beds, knowing that Life will not fail us, but that her myriad hosts will maintain the balance upon which all our lives depend.

INSURANCE. In our daily lives we are surrounded by dangers and risks. The father of a family may die suddenly and leave his widow and children penniless. He may be struck by an automobile and lie for weeks in a hospital. His home or his store may burn down. No one knows but that he may be the next victim of misfortune, so he is willing to pay a certain yearly sum of money in return for assurance that he or his family will receive a much larger sum in case of misfortune. He does this by joining a company of men who also want the same protection. Each member pays a certain amount into the treasury. When one of the members dies or his house burns down or he has an accident, the insurance company pays him or his family a certain agreed sum.

That, in a nutshell, is the fundamental principle of insurance. It rests upon the obvious fact that a burden which would crush one man can easily be carried if distributed among many men.

Insurance companies are of many kinds. Life insurance companies pay the survivors in case of death. Fire insurance companies pay for loss through fires. Others insure against accidents, ill health, the loss of ships at sea, against burglary and theft, against damages to automobiles or other property, against almost everything that can happen to cause a man physical or financial suffering.

The amount paid for protection is called the "premium." This is figured out according to what is called the "law of averages." This law is well illustrated in the case of fire insurance. For a great many years insurance experts have kept track of the numbers and kinds of houses that have burned down in the United States. From year to year the percentage of fires is about the same for each kind of building. Suppose it has been found that, out of every thousand grocery stores, one burns down every year, on the average. The chance, therefore, that any particular store will burn down is one in a thousand. The premium is fixed on this basis. If the figures showed that two out of every thousand had burned down, the premium would be twice as high.

Premiums vary also according to the amount to be paid in case of loss. If the grocer wishes to insure his store and goods for $2,000, he pays twice as much as he would if he only wanted to insure them for $1,000. Precautions are taken to prevent a man from insuring his property for more than it is worth, for that would encourage dishonest persons to start fires in order to obtain the insurance money.

Life insurance is figured on the basis of what is called the "law of mortality." Records for long periods show that out of every thousand persons so many on the average will die at the age of 30 years, so many at 40, so many at 50, and so on. From these mortality tables insurance companies are able to determine with reasonable accuracy how long a healthy person of any given age may expect to live. This enables them to fix their premiums at a scale which will give them a profit after paying all losses and expenses.

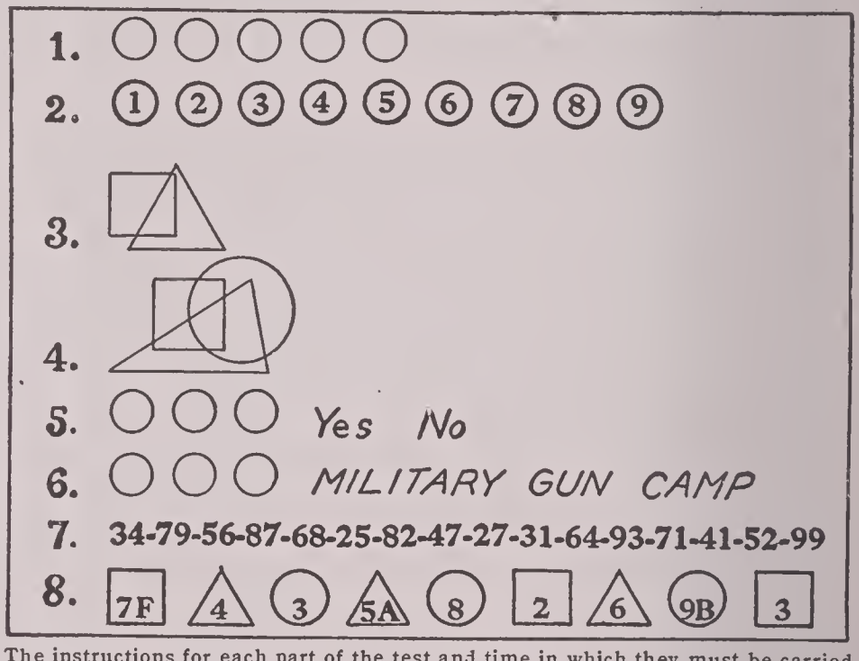
Employers in many states are obliged to carry "workmen's compensation" insurance to safeguard workmen and their families in case of death or injuries due to their employment. Many fraternal societies issue life, accident, and sickness insurance for the benefit of their members, and many big industrial plants do the same thing for their employees.

During the World War, the United States established a system of insurance for men and women in military or naval service. The government itself bore all the expenses of managing this war risk insurance and issued policies based on the death rate in time of peace, thus assuming all the hazard created by battle. The annual premium was approximately eight dollars per thousand dollars, a very much lower rate than that charged by insurance companies. Ninety per cent of the troops sent overseas were insured in this way.

The largest organization in the world for the writing of insurance is Lloyd's of London. This is an association of insurance companies which will accept almost any risk on payment of a premium which varies with the risk. The chief purpose of the association, however, is insurance of ships and cargoes, and for this purpose it maintains an enormous organization, which reaches to every corner of the globe, to collect shipping news. Lloyd's had its origin in the 17th century in a coffee house kept by a retired seaman, Edward Lloyd, in London.

INTELLIGENCE TESTS. The modern soldier must have intelligence, and, particularly for certain kinds of duty, a high grade of intelligence. Since it cost $2,500 to train, equip, and transport a soldier over seas during the World War, Uncle Sam was naturally interested in finding out, before he made this investment in a soldier, whether he had the mental ability for making a good one. So the intelligence of about 1,727,000 men was examined, and out of this number

HERE'S A TEST FOR QUICKNESS AND ACCURACY



The instructions for each part of the test and time in which they must be carried out are as follows: 1. Make a cross in the first circle and a figure 1 in the last circle—five seconds. 2. Draw a line from circle 2 to circle 5 that will pass *below* circle 3 and *above* circle 4—five seconds. 3. Make a figure 2 in the space which is in the triangle but not in the square, and make a figure 3 in the space which is in the square and in the triangle—ten seconds. 4. Make a figure 2 in the space which is in the triangle but not in the circle or square, and make a figure 3 in the space which is in the square and circle but not in the triangle—ten seconds. 5. If a captain is superior to a corporal, put a cross in the second circle; if not draw a line under the word "No"—ten seconds. 6. Make in the first circle the third letter of the first word, in the second circle the first letter of the second word, and in the third circle the first letter of the third word—ten seconds. 7. Cross out each number that is more than 60 but less than 70—15 seconds. 8. Draw a line through every *even* number that is not in a square, and also through every *odd* number that is in a square with a letter—25 seconds.

about 10,000 were rejected as mentally unfit—a clear saving of at least $25,000,000. More important, it was possible to pick the men best qualified to make officers, aviators, gunners, scouts, etc., and thus to select the best material for winning the war.

How was this done? By the use of charts similar to the one reproduced on the opposite page containing tests of quickness and *intelligence* and in the ability to follow directions exactly. Other tests called for the use of common sense, ability to discriminate between synonyms and antonyms, understanding of related words, and general information. Very specialized tests were used to determine the particular abilities required in such branches of the service as aviation. These army tests revealed that more than 45,000 of the men had mental intelligences no greater than those of ten-year-old boys.

TESTING THE SPEED OF EYE AND BRAIN



A big electric company in Germany tests apprentices by showing printed words for an instant like this, and then asking the boys to tell what they saw.

These tests are to a large extent based on what are called the Binet-Simon tests, which were devised by the French psychologists Alfred Binet and T. Simon to determine the intelligence of school childern.

Certain tests were selected which seemed characteristic of the ability of average or normal children at various ages from three to twelve. There was also a set for the age fifteen and another set for the normal adult. Such tasks as showing the nose, eyes, and mouth; repeating two digits (as four and seven) after they have been pronounced by the examiner; telling what objects are seen in certain pictures; giving the family name; and repeating a sentence of six syllables, were found to lie within the ability of normal three-year-old children. Similar but, of course, more difficult tasks were used for the different ages above three years. These tests were selected to test natural intelligence, rather than school or home training, and hence cover a wide range.

While it has been found by investigators that the normal child can do most of the tasks characteristic of mental ability at his age, the backward child is able to do only such tasks as can be done by normal children one to three years younger. It has likewise been found that the child who is able to do the tasks that can be done only by normal children two or three years older, also makes better school marks, and can do as much and as difficult school work as the normal children born two or three years earlier. Furthermore, he is not only able to keep up with his class, when promoted beyond the level of his chronological age, but he is usually found doing superior work and in some cases may be further advanced even more rapidly than the normal children without risk of overwork or failure. On the other hand, it has been found that those children who are two or three years *below* normal children in mental age tend to fall still further back in their work in school with advancing years. Thus these tests are of very great value to educators in the administration of school affairs, and use is also made of them by the courts in dealing with juvenile offenders.

The Binet-Simon tests have been translated into English and adapted to American conditions by Dr. Lewis M. Terman of Leland Stanford University of California. Similarly, the army intelligence tests have been adapted for public school use, especially by a committee appointed by the National Research Council. Their tests for grades three to nine inclusive have become the standard for these grades. Similar though less satisfactory tests have been prepared for primary grades, and group intelligence tests are available for high schools. Millions of public school pupils have been tested, and the practice of giving such tests to all school children is becoming a settled one. There is also a growing practice of segregating pupils in the public schools on the basis of such tests for the purposes of instruction. Classes for backward and subnormal children have long been provided in good public schools and classes now are being organized also for gifted children.

Similar tests, with broader scope to include the powers of more mature minds, have been used with varying success in some American universities in place of the ordinary entrance examinations. Business concerns have tried similar tests in hiring employees.

INTERNATIONAL LAW. "The law of nations," or international law, is the group of rules and principles which by general agreement the states of the civilized world observe in their relations with one another. Rome had a code of laws (called the *jus gentium*) governing its relations with foreigners in which we find some of the early beginnings of this modern international law. As the strangers who went to Rome were not citizens, they did not come under the jurisdiction of the Roman law and had to be governed by this separate code. With the growth and intercourse of the modern states at the close of the Middle Ages, the need of an accepted body of principles governing their relations began to be felt; and a number of writers, foremost of whom was Hugo Grotius, a Dutch scholar, published treatises on the subject. In Grotius' book, 'De jure belli ac pacis' (published in 1625), we have the basis of much of the subsequent work on the subject, including the following principles: (1) War should be carried on only for a just cause, and for the purpose of defense. (2) Do no more injury to the vanquished than is strictly necessary. (3) Force alone ought not to regulate the relations of peoples, for there is justice between states as well as between individuals. (4) To observe treaties is the wisest practice and the greatest strength of sovereigns.

In a strict sense international law is not *law*. It is only a body of customs and conventions which the nations have agreed to accept, and its force depends on the good faith of the states that accept it. Treaties, ordinances of states, decisions of international tribunals, and the opinions of prominent jurists are studied to determine what rules have been most generally accepted. In recent years international congresses have been held to determine and interpret various phases of international law, the most important of these being the Hague Peace Conferences held in 1899 and 1907 (*see* Hague Peace Conferences).

International law recognizes that a sovereign state has complete authority within its own borders, and in the case of maritime states a jurisdiction over the sea for a distance of about three miles from its coast. The freedom of the high seas, or that part of the ocean which lies beyond the three-mile limit of maritime states, is possessed by all.

In reducing the sufferings of war, international law made considerable progress, but the practices of the World War violated many cherished principles of this subject. In general the use of instruments of warfare which inflict undue suffering—such as poisoned weapons and expansive or "dumdum" bullets—is forbidden. Similarly the rules governing naval operations were largely modified in practice in the World War, owing to the new conditions under which the war was carried on. Formerly a neutral vessel could be seized only if it was carrying "contraband"—that is, goods of predominantly warlike use (such as munitions) or other articles (such as foodstuffs) destined for the enemy forces or government, or if it were seeking to break a blockade formally declared, or the like. But the new conditions of submarine warfare made such rules obsolete. A century ago private shipowners often received from a belligerent government commissions called letters of marque and reprisal authorizing them to make captures on the high seas, but these are no longer granted, and "privateering" is a thing of the past.

The question of neutrality is particularly important in connection with naval operations. Theoretically every state has the right to remain neutral during a war, and it is the office of the executive in such case to issue a proclamation stating that the country wishes to remain neutral. This means that the country will take no part in the war and will treat the belligerents impartially. Neutrals are forbidden to allow the use of their territory for military operations, to aid the belligerents in their actions, to trade in contraband, or to violate a blockade.

INTERSTATE COMMERCE COMMISSION. Suppose railroads could charge whatever they chose for carrying passengers and freight. In that case they might give certain individuals or companies lower rates than others for the same service. This discrimination would cause the favored persons or companies to succeed, while their competitors would fail or work at a disadvantage. In a similar manner the railroads might favor one section of the country more than another, by differences in rates and quality of service. When fruit and vegetable crops were ready to be shipped, if the railroads failed to furnish cars sufficient to get these perishable crops to market quickly, growers and shippers would suffer great losses.

In the early days of railroad development in the United States, such discriminations were common. To correct these practices the Interstate Commerce Commission was provided for by act of Congress in 1887. The Commission as now constituted is an administrative body of seven men whose duty is to see that railroad rates are fair and reasonable, that trains are run on a fair schedule, and that cars are distributed between shippers without favoritism. The railroads are required to publish their rates so that anyone may see just what he ought to be charged. The Commission hears complaints from passengers and shippers regarding both rates and service and the carriers must make the changes and corrections which the Commission orders.

The Commission also regulates all interstate "common carriers," such as sleeping-car companies, express companies, telegraph, cable, and telephone companies, and oil pipe-lines. All such companies are required to make annual reports to the Commission, and it has general supervision over the financial and business transactions of the companies.

Such regulation is based on the clause in the United States Constitution which gives Congress power to "regulate commerce among the several states." Hence the Interstate Commerce Commission deals in the main only with service and rates between points in two or more different states.

INVENTIONS *that have* CHANGED *the* WORLD



WHAT would the great Archimedes, or Shakespeare, or George Washington have said of the marvelous inventions of our day? From chaos to civilization, and on to the wonders of the 20th century, we trace the history of Man's inventive genius—which too often, alas! has brought only persecution from his contemporaries.

INVENTIONS. What is it that has made the barren earth a garden, that has changed the scene of man's life from a wild battlefield with the beasts to a workshop in which he can build up a new world? Professor Huxley and Herbert Spencer sat one day by the sea, watching a man bathe, and they laughed, as they gazed upon a naked man, to think that he should have overpowered all other creatures. What is that something—intangible, invisible—which impels man on in the universe, which has raised him to the very heights of power, and enabled him to fashion Nature itself to his will? It is the power of invention.

How man rose out of the mists of Time, how he made a fire, how he tilled the earth, how he sailed the seas, how he made machines; how he invented speech and writing and society; how he grew differently into races and nations; how he wrote books, painted pictures, and carved marbles; how hordes of savages ceased destroying one another and built up great empires; how their empires rose and swayed the world and fell; how Babylon became a heap of stones; how men tunneled the Alps and spoke across the seas; how they built cities, made laws, and set up schools; how civilization came out of chaos—there is no story in the world so wonderful as this, the story of the triumph of inventive man.

That is the dominant fact of the physical universe. There are those who tell us that man could never have obtained the mastery of the earth without his thumb, and it is perfectly true that if human beings had had four fingers and no thumb set over against them, the history of the human race could not have been. But amazing as is the human body—the most perfectly constructed machine upon the earth—men might still have been living in caves and battling with beasts if their bodies had been their chief possession. Man is a creature, says Shakespeare, looking before and after, and man's power of looking before and after has made him lord of Life.

The creative mind of man—this mind that cannot understand itself—has built up the whole structure of human knowledge, and on this foundation of knowledge has invented a thousand things that have made the world what it is.

If we could imagine a man born in the world tomorrow finding the world a blank, with not a human

being or a book to tell him yea or nay; and if we could imagine this man peering into the skies, digging into the earth, descending into the seas, flying into the air, measuring the stars and photographing the moon, bending intently over the earth, touching a field as with a magic wand and raising up flowers and fruit, snatching power from space and water to do the work his own hand could not do, taming animals to bear his burdens, making machines to increase a million-fold his powers of speech and sight and hearing, filling the air with music and the earth with color, talking to a piece of wax and teaching it to talk back to him, reproducing any scene his eyes could look upon for his pleasure after it had passed, speaking a word in America to be heard in Europe, making light to shine through stone and inventing eyes to see his own heart beating—if we could imagine such a man, doing this and a million times more than this, with no other instrument to help him than his own mind, grown from a tiny speck that no eye could see, should we not think of him with fear? Should we not think him almighty? Yet man has done that, and more than that. All that and more he has to his credit in his long journey through the centuries.

A GREAT INVENTOR OF ANCIENT TIMES



When the Romans besieged Syracuse, the mathematician Archimedes, who was a native of the city, lent his genius to its defense. He devised engines like this one for hurling rocks upon the Roman ships. The long and powerful spring lever was drawn back, a stone was placed on its spoon tip, the trigger was released, and the missile hurled out like a pebble from a sling.

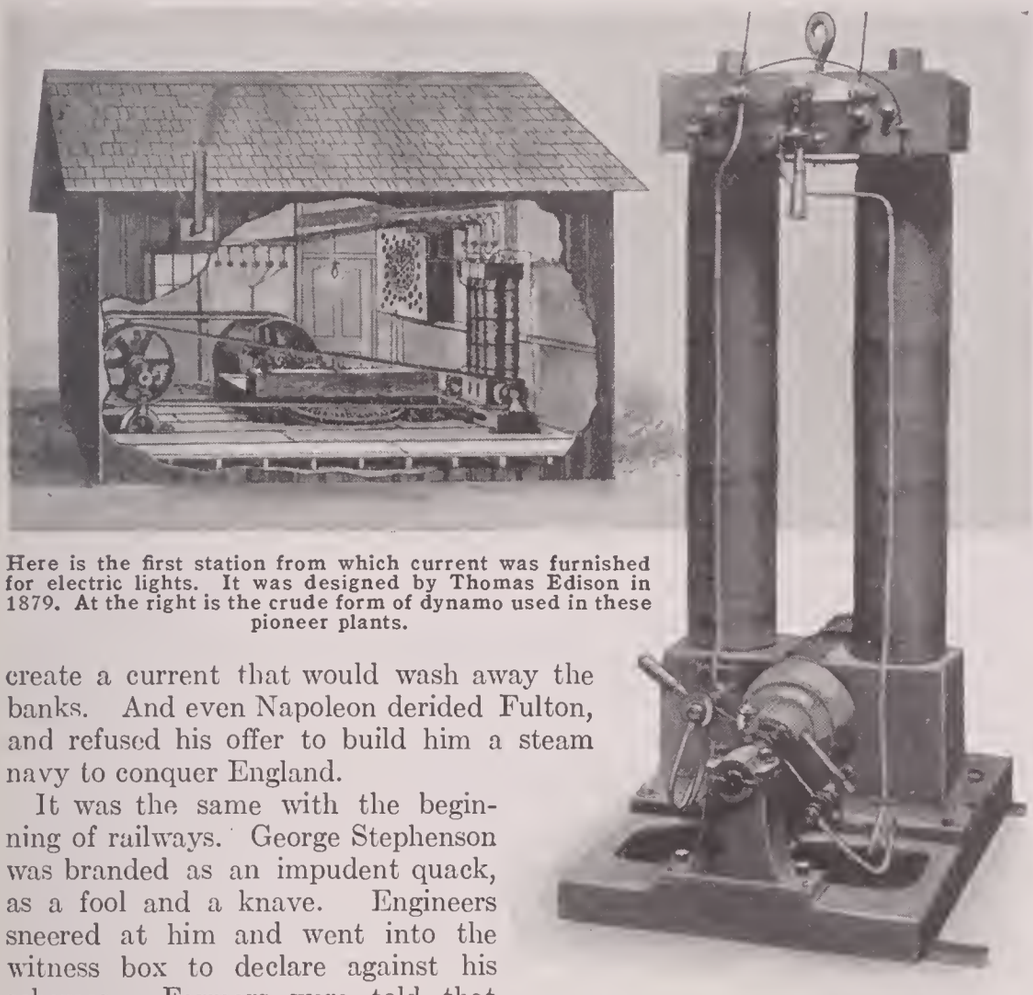
And yet the wonder of this age-long rise of man, freighted with the happiness of the race, has been the agony of it. Looking back on the history of invention, it is as if mankind has been reluctant to go forward, as if it had thrust back the cup of happiness held to its lips, as if, doubtful of its dark past, fearful of its darker future, mankind refused to tread each new path to light.

Not more than a few hundred years have passed since discoverers and inventors worked by stealth, hiding their knowledge from the world as if it were a crime. Copernicus, who proved that the earth moves around the sun, dared not publish his discovery till he lay dying. Giordano Bruno, who expanded the teaching of Copernicus, was burned at the stake in the streets of Rome. Galileo, who also taught that the earth does not stand still, was tried and imprisoned by the Inquisition. Joseph Priestley, the discoverer of oxygen, was driven from England to America because of his religious and political opinions. Harvey, who found that the blood circulates through the body, was almost ruined by ridicule and persecution. And later, when knowledge ceased to be a crime, the inventor and discoverer were forced still to work in secret by the tyranny of ignorance and neglect. Nothing is more terrible than the history of knowledge.

None of us can ever know how much of the joy of our lives was purchased for us by a heart-broken genius, crushed by a world that treated him with scorn. There is a graphic letter somewhere from Robert

Fulton, the first man to make steam navigation a success. "Never," says he, "did a single encouraging remark, a bright hope, a warm wish cross my path." A steamboat launched in Scotland before Fulton's time was allowed to fall to pieces on a canal bank because the owners of the canal declared that it would create a current that would wash away the banks. And even Napoleon derided Fulton, and refused his offer to build him a steam navy to conquer England.

THE FIRST ELECTRIC LIGHT PLANT



Here is the first station from which current was furnished for electric lights. It was designed by Thomas Edison in 1879. At the right is the crude form of dynamo used in these pioneer plants.

It was the same with the beginning of railways. George Stephenson was branded as an impudent quack, as a fool and a knave. Engineers sneered at him and went into the witness box to declare against his schemes. Farmers were told that railways would prevent cows from grazing and hens from laying; noblemen were told that the poisoned air from the engines would kill their pheasants and foxes. Householders were told that their houses would be burned up by the fire from the engines, boilers would burst and blow the passengers to atoms, landscapes would be made barren, and the canals would be reduced to unused ditches. Even the Duke of Wellington, who had won the battle of Waterloo, was afraid of railways.

When London was first lit with gas, Sir Walter Scott wrote a letter saying, "There is a madman here proposing to light London with smoke." And one of the greatest scientists then living, Sir Humphry Davy, said, "Before you can safely use a gasometer you will want a weight as big as Primrose Hill to keep it down." That was the opinion about gas, and it reminds us of a greater wonder still concerning electricity. Michael Faraday, the greatest electrician of his age, called electric light the idea of a quack, to be classed with table-rapping and other impostures!

What mighty changes men have lived to see! Contrast the introduction of gas and steamships and railways with the invention of the flying machine. Robert Fulton made his first steamboat friendless and alone; George Stephenson was denounced as an impostor. Today our inventors work with the eyes of mankind upon them, and with the applause of the world to encourage them.

It has taken hundreds of years to make men see that knowledge and invention are good for the world, and with the awakening of the world to this truth has come the transformation of human life. Napoleon came post-haste to Paris from Waterloo in exactly the same way that Constantine had come to Paris 1,500 years before. No great improvement in transit by land or sea had come in all that time.

How often do we think that William the Conqueror never read a book, that Queen Elizabeth never had a watch, that Shakespeare never read a newspaper, that Cromwell never saw a photograph, that George Washington wrote his dispatches by candle-light, that Napoleon never sent a telegram or traveled in a train, that Abraham Lincoln never used a telephone?

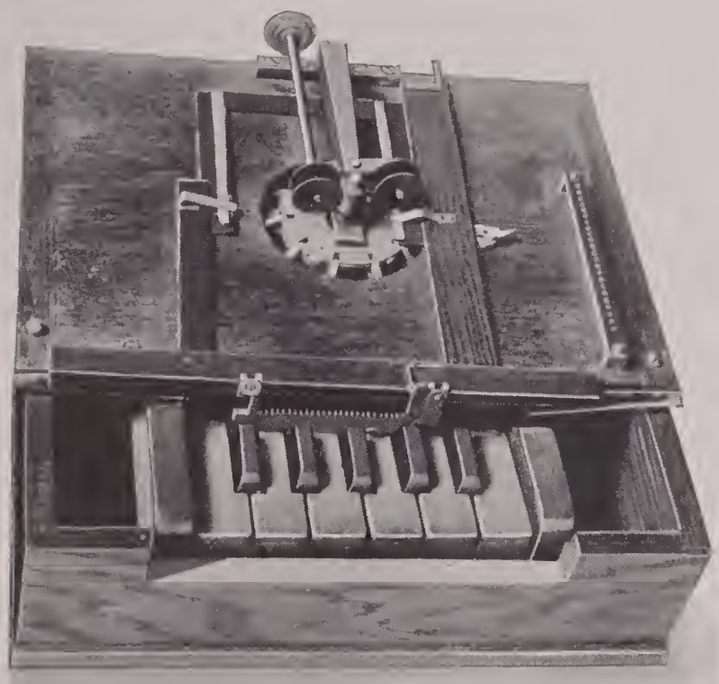
Today man has built up knowledge so that every American boy at school may know scientific facts that Sir Isaac Newton did not know; he has built up mechanical and scientific powers that enable us, first of all the generations that have ever been, to live our lives amid inventions that abolish time and space.

"I never handle the telephone," says Sir William Crookes, "without feeling that I am handling a miracle." And a miracle the telephone is. Yet it is only one member of a family of inventions, all belonging to our own time, which are changing the face of the world forever.

It would fill this book to deal with them, but think for a moment what all these things mean. Let us imagine a man who has availed himself to the utmost of the advantages of modern science, and let us imagine him sitting at home by his fireside on any night. He is reading a newspaper telling the story of the things of the day in all the countries of the world. A bell rings; he takes up the telephone

receiver and listens; it is the voice of a friend 200 miles away. A knock comes at the door; a boy hands in a wireless message from a friend a thousand miles out at sea. He reads it and sends his greeting back,

THE GRANDMOTHER OF TYPEWRITERS



Although it looks like a toy piano, it is really one of the early typewriters. It was patented in 1868, and was an exceedingly awkward machine, unable to compete in speed or accuracy with handwriting.

straight from his fireside to mid-Atlantic. And then he picks up a book and reads what Shakespeare wrote. And then, perhaps, he may tire of his book, and he touches the switch of a phonograph, and lo! Madame Melba is singing.

He can have such a concert from that phonograph as has never been possible in a public hall, with an array of singers and players such as has never come together in any hall at any time. And then, when the music has stopped, he may darken his room, and have thrown on to a screen living pictures of the life of men in almost any country on the face of the earth. He may take up the portrait of a friend across the earth, and may listen to his friend's voice coming from a box. He may think of any subject in the world, and have a book upon it brought to him. He may pick up the telephone and listen to a speech in a public hall down town. It would take too long to think of even half the things that a man may bring into his life by using the "impossible" things of yesterday.

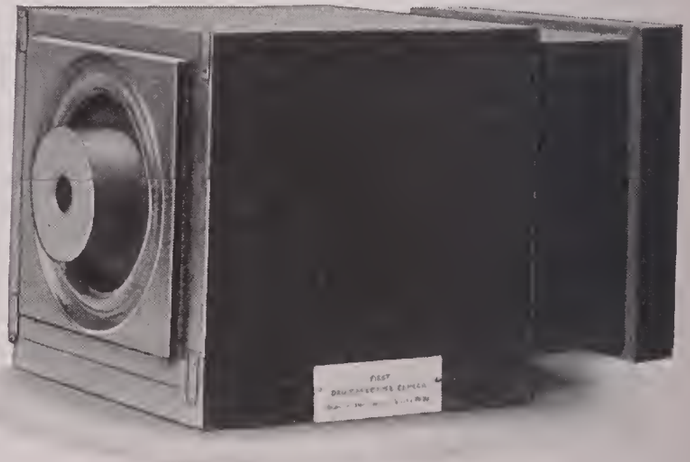
It is difficult to conceive the benefit that these inventions will bring to future ages. Let us suppose that they had been invented 300 years ago. We should have been able to see Shakespeare conducting a play, and to hear his voice. We should have been able to sit in our room and see, thrown on a screen, the living picture of Cromwell leading his troops at Marston Moor, the execution of Charles Stuart in Whitehall; we should be able to see the frightful horrors of the French Revolution reproduced before our eyes; we should be able to see Napoleon in his rise and fall. We should see the throwing over of the tea in Boston Harbor and the midnight ride of Paul Revere; George Washington and the framers of the Constitution; Abraham Lincoln walking down the streets of Washington. We should be able to sit in our room and hear Shakespeare and Milton and Cromwell speak. We should know the truth about a thousand things of which history is in doubt, and history itself, we may be certain, would have been changed on every page.

So, we may be sure, will these things change the world in the time that is coming. Nothing seems impossible to an age in which we can talk into a box and make the box talk back to us. Nothing seems impossible to men who can thrust their hands into space and bring back power, who can tap a message into the air and bid it go where they will.

What an unthinkable power is a great invention! It can never end. It knows no limit. It leads from step to step. It is like a beacon light that beckons men on from age to age, bidding them do more and more. No man can think of the World War without thinking of the great inventors. They made it possible, for good and ill; without their work that war never could have been. Think of the men whose spirits must have hovered on those battlefields. Think of that work of theirs which went on through the war. The great unseen army of inventors and discoverers—was it not there all the time?

Archimedes was there. Before Christ was born in Bethlehem he invented pulleys and windlasses and water-screws, drove great machines by compressed air, and lifted weights by hydraulic power; and there, in that appalling upheaval of the world, his levers and pulleys were working still. He loved his work, that

THE FIRST SUCCESSFUL CAMERA



These old "daguerrotype" photographs on copper plates were taken for the first time with a camera like this. One box telescoped inside the other for focusing.

everlasting man, and war destroyed his body as he sat thinking out a problem; but war could not destroy his mind; and when the roll is called of those who won the war Archimedes will be there.

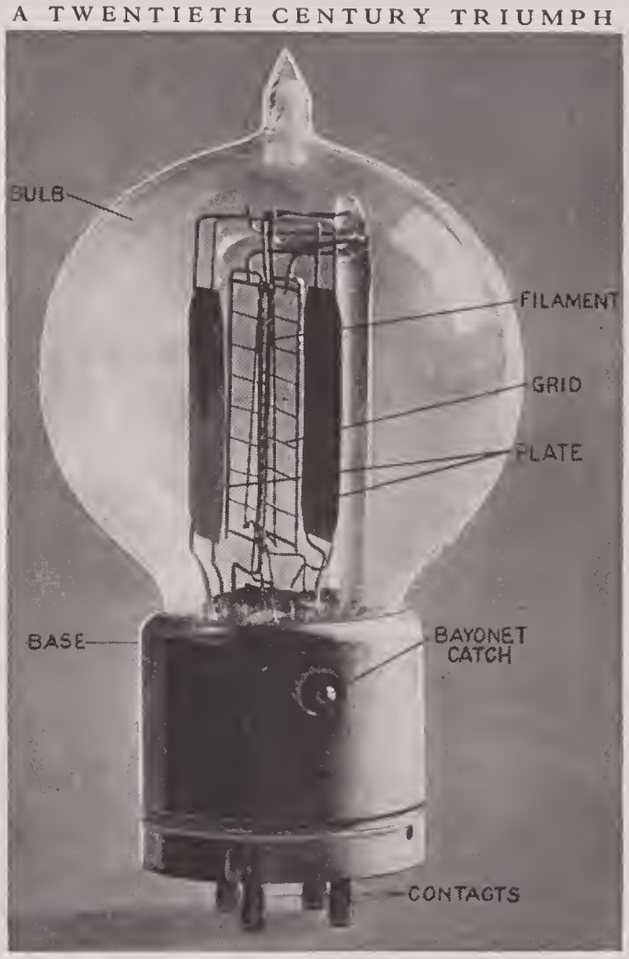
And there was Roger Bacon, the wonder-man who stirred the vision of Columbus, the monk and thinker and inventor whose knowledge frightened men 600 years ago, who knew all about magnifying-glasses and perhaps invented gunpowder, and whose books, lying so long unknown, were revealed at last to set men thinking and inquiring into the secrets of science.

And surely there were on the battlefields those men who found the laws of chemistry, who probed into the heart of matter and brought its secrets out. Quaint Henry Cavendish was there, with all those gases he spent his life in finding out. Men said of him that he spoke fewer words in 80 years than any other man who had lived so long, and they might have said that he did as much work in 80 years as any other man. He solved great mysteries of heat and electricity, he studied explosions, and without the things he added to the book of knowledge we never could have won the war.

And in his steps came that long line of famous electricians in which Faraday and Humphry Davy shine like stars. Both these were there. It was Faraday, the Yorkshire blacksmith's son, who listened to Davy lecturing, who became a boy in his laboratory, and so outran his master that towards the end of his life the noble Davy said, "My best discovery was Michael Faraday." This blacksmith's son it was who laid down the beginnings of the telegraph and telephone and a thousand other applications of electricity, who began the work of steel alloys, improved optical instruments, and gave lighthouses their mighty lamps. He kept a record of all his experiments, and they numbered 16,000 when he died.

Sir Isaac Newton was there, with the laws of light behind all telescopes; and there was the spirit of Galileo, which every telescope enshrines. Brunel was there, with his great idea of tunnels, and the shield he made for boring them after watching a ship-worm at work. Lord Kelvin was there—we cannot imagine the war without those precious electrical devices, cable instruments, compasses, and mathematical calculations, which we owe to the work that this great man began in a Glasgow cellar.

A TWENTIETH CENTURY TRIUMPH



The audion or amplifier shown above is one of invention's latest achievements. It has made wireless telephony possible and greatly extended wireless telegraphy. Its function is to detect exceedingly small electric currents and amplify them.

The great founders of steam-power were there if any were—James Watt and George Stephenson and Richard Trevithick and Robert Fulton, who struggled against a scornful world to build up those trains on land and ships by sea which have moved these multitudes of men across the earth. And Nasmyth, his steam-hammer ringing through the arsenals, was surely at the war, with that unconquerable spirit of Joule, who defied the British Association which laughed at him, and gave us the first idea of the value of the heat produced by mechanical forces.

And surely the spirit of Wilbur Wright was there, the great American genius of human flight, the plain, lovable man who thought that one day the flying men would sweep the curse of war out of the world. There he was, with his great compatriot Edison, whose work was hardly ever for one single day missing from the field of war.

From battle-front to battle-front, across the continents and oceans, up in the air and down in the sea—there was the genius of the wireless men: of Clerk Maxwell, who laid the basis of the scientific theory, of the clever German Hertz, who first constructed apparatus to receive the electric waves; of the Italian Marconi whose practical inventions have abolished space and distance for the human voice and utterly transformed the world.

All these were there; and there, thank God! was Lord Lister, too, whose memory every wounded man must bless, whose work in antiseptic surgery goes on, and will go on through the ages, till it has saved more lives than war can take.

So, through the power of invention, the genius of the Past was fighting on the battlefields for human liberty; so the Past came to the aid of the Future in that great cause for which our heroes fought and fell. Invention carries on man's power from age to age; it may be said that it is making man immortal. Man, by his inventions, is making it impossible for the best that is in him to perish from the earth. Follow that thought for a moment; let us take one of those inventions through which man has carried on his power and thrown it forward into time so that it does not die with him. Take printing. By the inven-

tion of printing man has made his mind immortal, *whatever may happen to the body he inhabits or the life by which he moves.* If Shakespeare had utterly perished when he passed from this visible world, his mind could not have perished with him. It lives today as when he walked in Stratford. Had Shakespeare been with us himself he could have had no greater power than he has still. When the first man who read Shakespeare read those last words of King Lear to Cordelia, they must have stirred in him the same emotions that they stir in you and me. When Shakespeare wrote—











Here are three of the changes invention made in civilized life in the 19th century alone. The post horse gave way to the telegraph; the sewing machine did away with much of the tedious hand sewing; while the typewriter began to do the bulk of the civilized world's writing.

> There's a divinity that shapes our ends,
> Rough-hew them how we will,

he was giving the very thought that is in our minds just now to millions of people then unborn, and he will be giving this same thought to millions of people in a thousand years to come.

The days when knowledge was gathered slowly and with peril, spread from place to place by a faithful few, often at the risk of life, have passed forever, and nothing can be lost or locked up now. The Mind of Man is covering the earth. His inventions are making his mind independent of time and space as well.

Take three of these inventions only—pictures, music, and books. Who can listen to the mighty dramatization of sound that we call Handel's 'Messiah' and not feel something of the power and grandeur of natural forces? Who can look on the materialization of a vision that we call Raphael's 'Transfiguration' and not feel something of the mind that conceived it, and the spirit of the solemn scene it represents? Who can read the immortalization of piercing anguish in Mrs. Browning's 'Cry of the Children' and not feel back in another age, listening to the beating hearts and sobs of little ones whose graves have been green these 60 years? The old, old story that thrills you as you sit remembering by the fire, the book that stirs your mind and opens up another world of thought for you, the picture on the wall that grips your heart as in a vice, are instruments of the mind and soul of man working in you across the earth and through the years. They carry the mind to far-off places and to other days; a sound you heard in Egypt comes, and you are on the Nile again. They bring back memories of friends that we shall never see again on earth; they move us to gladness and tears.

And so, through ages yet to come, the songs, the books, the pictures that we know will stir the hearts of men and women, they will carry into the centuries the mind of the age that gave them birth. It will not die, and its influence will not fail. The human mind has broken down the barriers of time and space, and clothed itself with immortality.

It is one of the amazing triumphs of the mind of man that, when faced by human impossibilities, it makes a machine to do them. Man has today a million times the power he had a thousand years ago—power won

from Nature, snatched from wind and river and sun. He is taking hold of the invisible powers of the world. He is harnessing natural forces to do the work his own hand cannot do. He sends his messages through the air; he hitches his engines to the rivers; he floods the dark world with light drawn from beyond the ether. Shakespeare's Puck promised to "put a girdle round the earth in 40 minutes"; man can do it now in four.

Man can photograph a thing he cannot see; he can magnify sight and speech, and can store up sound. He can run like a deer, can fly like a bird, can swim like a fish; but he can do more, for he can travel faster than a bird, by a power that he can stop with his finger, and he can cross the earth without losing touch of home. From mid-air and mid-ocean too, from down in the earth and down in the sea, he sends his message where he will. The time will come—indeed, the time is now fast coming—when man will lengthen life, but while that day waits he magnifies the work that he may do in his allotted span.

WONDER CHILDREN OF THE HUMAN BRAIN



In the air, on land, and on the sea, what wonders man's skill and invention have wrought! These things that seem so commonplace to us are fully as strange as any of the magic deeds told in the 'Arabian Nights', or in the fables of hero gods of old. What ancient dreamer could have conceived of the flying machines, the gigantic battleships firing cannon with 20-mile range, the torpedo boats talking to each other by wireless telegraph, the locomotive, the automobile, or the marvels of steel building?

In the strict use of the word, an invention is a mechanical contrivance through which we may realize our purpose more readily than before. In the prehistoric age man invented speech, if we may call that an invention; fire, with the arts of heating, lighting, and cooking; tools, the axe, the knife, the plow, and such weapons as the bow, the sword, and the lance; pottery, wheeled carts, and boats to row and to sail. These are prehistoric inventions, which are found in many parts of the world. In some regions the following inventions had been made before the dawn of history: the smelting, working, and hardening of metals; irrigation through dams and canals; water-wheels, glass, bricks, writing, with the making of paper, etc. With the invention of writing recorded history begins.

It is remarkable that, when men had learned to write, for thousands of years they practically ceased to invent. Between 4000 B.C and 1100 A.D. no invention was made equal in importance to the above, but only improvements in minor details. Ships were made larger, clothes were made richer, but the real activity of man was directed towards the things that writing made possible — namely, society based on written law; literature, history, science, and philosophy.

The third period in the history of inventions begins with the introduction of the magnetic compass about 1200 A.D., of gunpowder about the same time, and of printing about 1450. These may have been invented in China long before, but the West discovered them independently, and made great use of them to discover America, to shatter feudalism, and to reform the church and free men's minds. Since then some of the great inventions are the telescope by Galileo (1609), the pendulum clock by Huyghens (1657), a practical microscope by Leeuwenhoek (about 1660), an improved steam engine by Watts (1769), spinning machinery by Hargreaves, Arkwright, and Crompton (1763–74), the

power loom by Cartwright (1785), gas lighting by Murdock (1792), vaccination by Jenner (1796), the steamboat by Fulton (1807), the railway locomotive by Stephenson (1814), the reaping machine by McCormick (1832), the photograph by Daguerre (1839), the electric motor and dynamo by Faraday (1832), the telegraph by Morse (1844), the sewing machine by Howe (1846), the open-hearth steel process by Siemens-Martin (1866), the telephone by Bell (1876), the linotype by Mergenthaler (1884), the gas engine by Daimler (1884). Other inventions that struck out new lines were the automobile, the submarine, the airplane, the application of chemical analysis to every branch of manufacture, and the means of making exact measurements. The first decade of the 20th century saw the invention of the remarkably sensitive audion, an instrument for detecting exceedingly small electric currents (*see* Audion; Wireless Telegraph and Telephone).

The development of these fundamental inventions covers every field of modern life—the compound and turbine engine, applied to railroads and to ships, the numerous uses of gasoline engines, screw ships of iron and steel, oil and sugar refining, matches, the cotton gin, the circular saw, spring clocks, aniline dyes, spectacles, antiseptics, various serums for inoculation, galvanized iron, paper from wood pulp, machines for every purpose from the making of pins to the making of armor plate, the phonograph, the motion pictures. The list is endless and is ever growing, and at the root of practically all of these inventions lie the great advances in abstract science in recent times, made by great scientists who sought only to increase the world's stock of knowledge, without thought of practical application or hope of gain.

MAKING TOIL EASIER



Once human labor was the cheapest thing there was, and no effort was made to conserve it. But now invention bends all its resources toward reducing the necessity for manual toil, as in the case of the machinery which you see here, replacing the stevedore, with his truck.

Io. This beautiful maiden, the daughter of Inachus, king of Argos, as the story is told in Greek mythology, was beloved by Zeus (Jupiter). To protect the maiden from the jealousy of Hera his wife, Zeus changed Io into a white heifer. But Hera was not deceived and appointed the giant Argus, "the all-seeing one," who had a hundred eyes, to watch over her. Hermes (Mercury), the winged god, commissioned by Zeus to carry off the heifer, slew Argus, first charming him to sleep by playing on the flute and then cutting off his head. Hera used the eyes of Argus to decorate the tail of the peacock, her sacred bird. But the jealous goddess, not yet satisfied, sent a gadfly to torment Io, who fled over land and sea, without a moment's rest, until finally she was restored to human form.

Iodine. The insistent demand of Napoleon I for ammunition to carry on his wars was the indirect cause of the discovery of an element which has proved as great a blessing to mankind as the Napoleonic wars were a curse.

In 1812, Bernard Courtois, a manufacturer of saltpeter, one of the important ingredients of gunpowder, was working feverishly in his shop in Paris to increase the French supply of this material. While extracting salts of potash from ashes of kelp, the great nitrate-producing seaweed, he came upon a strange new substance—a grayish-black solid with a bright metallic luster. This was iodine, the chemical element now so widely used in medicine.

In 1831 Dr. Coindet of Geneva, Switzerland, made the first medical use of the newly discovered element. His success was so amazing that iodine and its many compounds immediately sprang into world-wide fame as preventive and curative agents.

Iodine is known in chemistry as one of the four halogens, the others being chlorine, bromine, and fluorine. Physicians use iodine and many of its compounds with other chemicals in the internal treatment of rheumatism, pleurisy, Bright's disease, asthma, goiter, bronchitis, and in chronic lead and mercury poisoning. Its chief compounds, called iodides, are formed with various metals. Iodine is used in many forms as a disinfectant and antiseptic, and is painted on wounds and bruises to relieve inflammation. The sweetish unpleasant odor sometimes encountered in hospitals is caused by iodoform, a compound of carbon, hydrogen, and iodine used in surgical dressings.

Pure iodine is a black crystalline substance which turns to a very heavy vapor at 184° Fahrenheit. Seaweed yields iodine, but the greater part of the world's supply comes as a by-product from the nitrate beds of Chile.

Iodine has important commercial uses, chiefly in making photographic chemicals and in preparing dyes. The antidote for iodine poisoning is a copious draught of starch water.



This display is a symbol of Iowa's riches. Corn—a veritable golden flood of it—is the cornerstone of the state's wealth.

Extent.—East and west, 310 miles; north and south, 205 miles. Area, 56,147 square miles. Population (1920 census), 2,404,021.
Natural Features.—Rolling prairie country. Chief rivers: Mississippi, Des Moines, Iowa, Cedar, Missouri, Big Sioux.
Chief Products.—Corn, oats, hay, and wheat; hogs and cattle; butter and eggs; coal.
Chief Cities.—Des Moines (capital, population, about 127,000), Sioux City (72,000), Davenport (57,000), Cedar Rapids (46,000), Dubuque (40,000), Waterloo (37,000), Council Bluffs (37,000), Clinton, Burlington, Ottumwa, Mason City, Ft. Dodge (over 20,000).

IOWA. A gigantic granary bursting with food sufficient to supply a continent; a huge storehouse of nature's bounty; a region of gently undulating farm and grazing lands teeming with yellow, waving grain—that is the state of Iowa today, barely three-quarters of a century after her forests first felt the ax of the pioneer and her fertile prairies first yielded to the shining plowshare. Iowa lies in the very lap of the richest agricultural region of the world, flanked on her eastern and western borders by imposing bluffs which during the process of erosion were left standing as ramparts against the lordly Mississippi and the turbulent Missouri. Since immemorial time these bluffs have stood guard over the broad kingdom which lies between them—a kingdom designed by nature to be the priceless heritage of those who braved the perils of wilderness and savage to wrest away its riches.

The rich black soil of Iowa, in some places several hundred feet deep, is more valuable than all the gold and silver mines in the world. Twenty-fourth state in the Union in point of area, and 10th in point of population, Iowa for years has been the foremost state in production of corn, hogs, and horses, and one of the three leading states in the number of cattle and total value of farm crops. No state has a greater proportion of farm land.

Uncle Sam has made few investments which have repaid him more richly than has Iowa. The 56,147 square miles which comprise the state's area constitute a comparatively small portion of the Louisiana Purchase of approximately 1,000,000 square miles, acquired from France at a cost of about $27,000,000. Let us say the United States paid Napoleon $1,000,000 for Iowa. Every year Iowa farmers get three times as much as that for their colts. It is barely one-twelfth of the value of the eggs in Iowa nests each year, for every month the Iowa hen pays back Iowa's original cost. Today the improved farm lands of the state, bought for four cents an acre, are worth more than $150 an acre, or more than five billion dollars all told. The value of the diversified products of these lands mounts into many hundreds of millions annually. Iowa as a state is not so very old; she has been in the Union only since 1846. Yet with her hog money alone she could float a Liberty Loan of a billion dollars, and with one year's corn crop she could build another Panama canal.

The hardy men and women, of the pure-bred American stock, who crossed the Allegheny and Blue Ridge mountains after the War of 1812, began the settlement of Iowa in the years following 1825. They had become interested in Iowa through information concerning the limitless fertility and excellence of its soil brought back by Col. Zebulon M. Pike, who had made an historic journey to the sources of the Mississippi River a few years previously. Fort

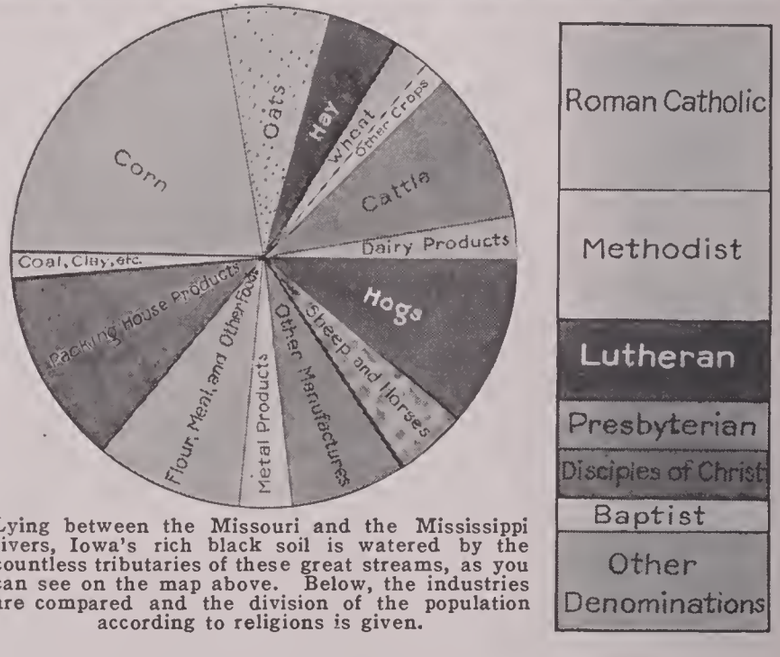
A GREAT STOREHOUSE OF NATURE'S BOUNTY



Madison, scene of much fighting in the Black Hawk War of 1832, was one of the first towns founded. Burlington and Dubuque likewise were settled early. Until recent years the increase in Iowa's population was exceptionally rapid. Iowa's wonderful farm lands are nearly all developed, about 29,000,000 of the state's 35,000,000 acres being under cultivation. The ratio of rural to urban population is larger than that of any other state. Iowa has only nine cities which possess more than 25,000 inhabitants.

Iowa's educational system is one of the finest in the country and the state's percentage of illiteracy is among the lowest, being only 1.7 per cent, compared with 7.7 per cent for the rest of the United States. The principal institutions of higher learning are the state university, at Iowa City, the State Teachers' College, at Cedar Falls, and the State College of Agriculture and Mechanic Arts at Ames. Iowa is preëminently the state of the "little red schoolhouse," there being more than 21,000 separate school buildings scattered through the commonwealth, thousands of them in rural communities and hamlets.

Although the romance of Iowa's meteoric growth as a center of agricultural wealth is the outstanding feature of her development, her people have made considerable strides in industry in recent decades. This has been made possible largely through the development of the large deposits of bituminous coal in the central part of the state. Another factor which is now contributing enormously to Iowa's industrial expansion is the famous Keokuk dam across the Mississippi River at Keokuk. This dam,



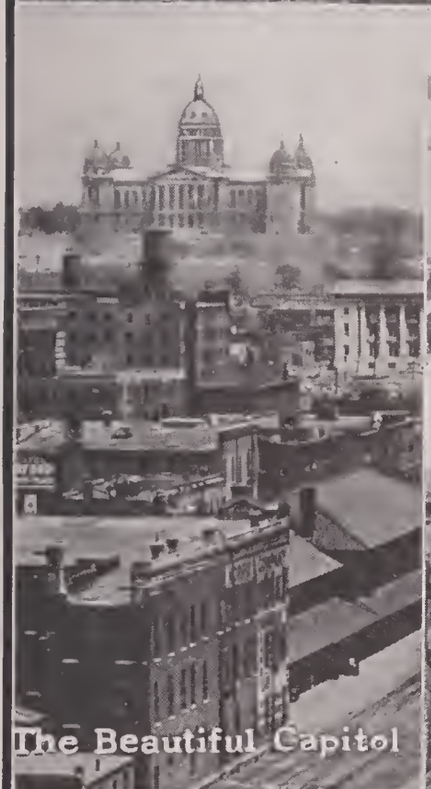
Lying between the Missouri and the Mississippi rivers, Iowa's rich black soil is watered by the countless tributaries of these great streams, as you can see on the map above. Below, the industries are compared and the division of the population according to religions is given.

PICTURE STORY OF IOWA'S GREATNESS

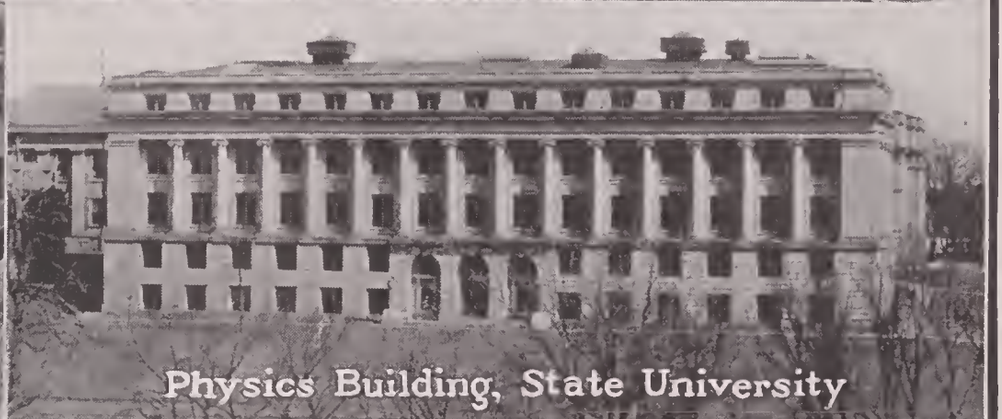

Iowa Raises Fine Horses and Other Live Stock


A Leading Grain State


Great Egg Production


The Beautiful Capitol


Keokuk's 120,000 Horse Power Dam


Physics Building, State University

Above are three wealth-producers, and below are three uses to which Iowa has put her wealth. But they too are producers, for they return a progressive government, abundant power, and well-trained young men and women to the community, and all these increase still further the prosperity of the state.

contained in the Easy Reference Fact-Index at the end of this work

A BIT OF PICTURESQUE SCENERY ALONG THE IOWA RIVER



The Iowa River, which flows southeastward across the state, has cut this small gorge through the limestone underlying the Iowa plain, leaving a jagged and picturesque formation, overhanging the peaceful waters. Here trees and bushes have taken root, producing a scene which is typical of most of the river valleys of the state. On the gently sloping land above are situated the fertile farms.

one of the longest in the world, was completed in 1913 by a private water-power company, and is regarded as a remarkable feat of engineering. It is 1¾ miles long, cost $10,000,000 to build, and generates 120,000 horse-power in its score or more of turbine generators. It supplies electric current to St. Louis, 145 miles away, and also to many smaller cities. By means of a lock steamboats are raised 40 feet to the level of the river above the dam.

Many Industries of the "Hawkeyes"

Meats, butter and cheese, flour and grist mill products, lumber and timber products, foundry and machine shop products, and farm implements are among Iowa's principal manufactures.

A picturesque industry, and one which is attaining much commercial importance, is that of fishing for mussel shells for the manufacture of pearl buttons. At night one may catch a glimpse of the lonely mussel fisherman in his flat-bottomed scow, dragging the river's bottom by the dim light of the moon. Millions of mussels have been hauled up from the muddy depths of the Mississippi to be fashioned into pearl buttons, and not a few fortunes have been made by mussel fishermen lucky enough to find valuable fresh-water pearls in their catches. Some of these pearls are nearly flawless and bring large sums. The course of the Mississippi abounds in button factories, an industry which has sprung up only in recent years to utilize the supply of mussels.

Like all regions situated in the midst of a vast inland territory the climate is typically continental in extremes of heat and cold. Government records for 26 years show a maximum range of 160 degrees, from 113 degrees above zero to 47 degrees below. The annual precipitation is well apportioned to bring the best results for crops, with 80 per cent of the rainfall coming during the crop-raising months from April to October.

The name Iowa is derived from an old Indian word signifying "sleepy waters," and was first applied to the Iowa River. The state received its nickname, the "Hawkeye State," in the halcyon days of the Burlington *Hawkeye*, one of the famous newspapers in the early history of American journalism.

The French explorers Marquette, Joliet, and Hennepin touched the borders of the state in the latter part of the 17th century. A hundred years later (1788) Julian Dubuque obtained from the Indians the present site of Dubuque and established a trading post and lead mine there, but this enterprise was abandoned in 1810.

Iowa's Progressive State Policies

Probably in no way is the alert progressiveness of Iowans and their wideawake receptiveness to new ideas better shown than in the political history of the state. As far back as before the Civil War, Iowa was one of the first and most enthusiastic states to champion the cause of the abolition of slavery, and more than 75,000 of its men, one-tenth of the population, fought for the North. Iowa was one of the first states to enact a prohibition law, in 1884, and Des Moines was the first important city in the country to adopt the commission form of government. Iowa also was a pioneer among the states in adopting direct primaries, having passed such a statute in 1907.

The broad prairies of Iowa are traversed by about 10,000 miles of railroads and 500 miles of interurban roads, only three states having a greater mileage.



PAST and PRESENT of the EMERALD ISLE

The Smiling Sister Island of Great Britain—Its Early Civilization and Conversion to Christianity—How Ireland was Conquered and Oppressed by the English Kings—The Long Struggle for Self-Government—The Irish Free State

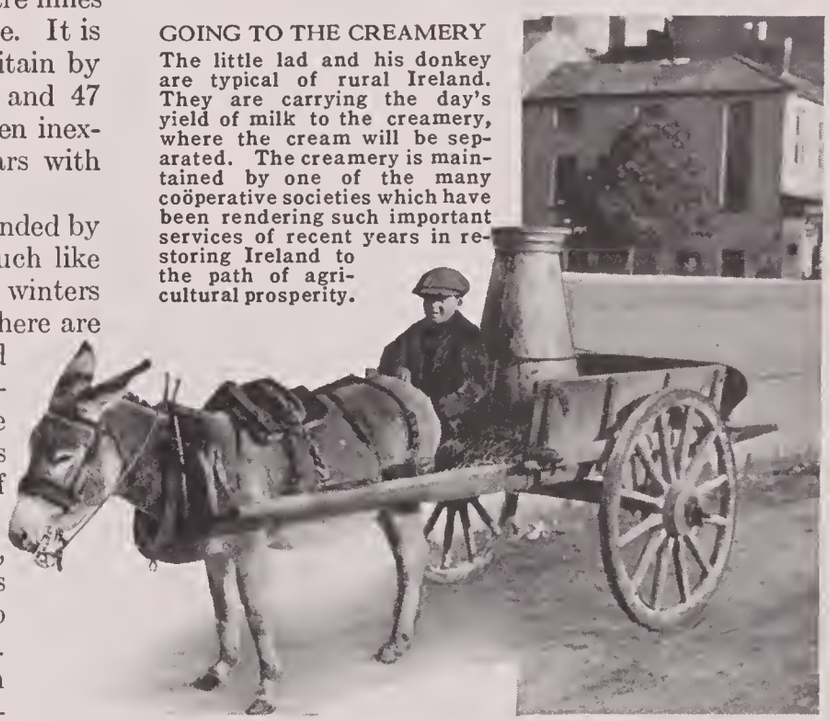
IRELAND. A romantic history, scenic beauty, the charm of a warm-hearted and impulsive people, numerous ties of blood and sympathy, and political problems of world interest give to Ireland an importance out of all proportion to its 32,531 square miles of area—about the size of the State of Maine. It is separated from its sister island of Great Britain by only 13 miles of water towards the north and 47 miles in the south, and its fortunes have been inextricably entangled for more than 1,500 years with those of its Anglo-Saxon neighbor.

In surface Ireland is an inland plain, surrounded by a rim of low mountains. The climate is much like that of England, mild and temperate, but the winters are even warmer, and there is more rain. There are numerous rivers, of which the Boyne and Liffey in the east, the Barrow and Blackwater in the south, and the Shannon in the west are most important. Lough Neagh is the largest of the lakes, and the Lakes of Killarney in the south the most beautiful.

The population is of "Mediterranean" stock, according to anthropologists, and represents two waves of Celtic-speaking peoples who came by way of England from the Continent. About 74 per cent of the people are Roman Catholic. While the northern counties (Ulster) are predominantly Protestant (mostly Presbyterian), the western and southern counties are nearly altogether Catholic.

Historic antagonisms even more than religion separate the Protestant Ulstermen from the Catholic south. Economic differences also serve to divide the unhappy island. The Ulstermen are hard-headed men of business whose trade and manufactures have enriched their part of the country. They are accustomed of old to hold most of the political positions and to play the part of a ruling class. The south, on the other hand, is made up of a Catholic peasantry who, perhaps because they have long been overtaxed renters, are less progressive than their neighbors to the north. They cherish old traditions and old grievances; but they are essentially a kindly, generous, and talented people, with a wealth of imagination and poetry in their make-up.

The land in Ireland is mostly leased in small holdings, averaging not more than 28 acres to a farm. The soil in most places is thin, and the rainfall so heavy that not much grain can be raised. Most of the country is given over to grass-land, more than in any other part of Europe. In consequence cattle-raising and dairying are widespread. Eggs, milk, and cheese are exported to the London market. Potatoes are the staple crop and food of the peasantry, and the years of potato blight have always been years of famine. The climate makes the raising of flax profitable, and much of the north is given over to this crop which partially supplies the linen manufactures of Belfast. There is almost no iron or coal in the



GOING TO THE CREAMERY
The little lad and his donkey are typical of rural Ireland. They are carrying the day's yield of milk to the creamery, where the cream will be separated. The creamery is maintained by one of the many coöperative societies which have been rendering such important services of recent years in restoring Ireland to the path of agricultural prosperity.

A PEASANT FARMER'S COTTAGE ON THE "OLD SOD"



The Irish countryside is dotted with thatched cottages of rough stone like this one. Their white walls stand out sharply against the green of the fields and the gray of the rocky hills. In one end dwells the farmer with his family and in the other the pigs are sometimes quartered.

country and little water-power. This had proved a great handicap, but nevertheless for a century past there has been a development of industry, and the busy linen and ship-building industries of Belfast are world famous.

The basic economic trouble of Ireland has been that it has never had either the agricultural or mineral resources to support a large population. The peasant has lived close to the margin of existence and has never been able to hope that he could be much better off. Until a recent date he has received little sympathy from his landlord, who often lived a long way off in England and was chiefly interested in getting as much rent from his estates as he could.

The history of Ireland is a history of conquest and oppression by the English. Englishmen would be the first to say that Ireland is the worst blot on their record. The early history of Ireland before the English migration is a time to which the Irish love to look back. While the Saxon invaders of the larger island were still barbarians, Ireland for a time possessed one of the most advanced civilizations in western Europe. This was the time of St. Patrick (died 461 A.D.) and of a flourishing Irish Celtic Christianity. Henry II, one of England's great kings, conquered the Irish in the latter part of the 12th century. But only the eastern part of the island was much affected by English institutions, or for centuries adopted the English language. The rest of Ireland was long given over to clans who warred with one another and with the English. Irish customs even invaded the "English Pale" about Dublin, and within a few generations English settlers within the "Pale" tended to become Irish in outlook and sympathy. The religious Reformation, which left Ireland unchanged in its Catholic faith while England broke with the Pope and set up a national church, still further widened the breach.

THE CROSS OF KELLS



This is one of the famous ancient crosses set up by the early Irish Christians. It is at the market town of Kells, forty miles northwest of Dublin.

The Tudor sovereigns began in the 16th century the policy of enlarging English influence by settling large "plantations" of English and Scots in Ireland, dispossessing the Irish tribesmen from their land and driving them into the west. Further dispossessions went on under the first Stuarts, and whole tracts of north Ireland were taken from a desperate peasantry, to be given to Scottish intruders. Then, when Charles I of England had his hands full with the mutinous Long Parliament, Ireland rebelled and put to death thousands of Protestant settlers (1641). Oliver Cromwell reconquered the country and with such rigor that his name remains a byword there. More land was taken from the peasants to be distributed among the English.

BITS OF IRELAND, NORTH AND SOUTH



Here is one of the famous Irish jaunting cars, with its side seats over the wheels, coming down the river road near Skibbereen, at the extreme southwest point of Ireland. As you can see from the smiling country-side and the stone bridge, this part of Ireland deserves its reputation for picturesque beauty.



This view shows a bit of the Giant's Causeway, on the north coast of Ireland. The boy is sitting in what is known as the "Wishing Seat," and tradition says that a wish made while sitting there will come true. Notice the remarkable structure of the rocks which make up the causeway. They are six-sided columns of basalt, set close together exactly like a pack of lead pencils.

LOOKING NORTH IN SACKVILLE STREET, DUBLIN



In the foreground is the O'Connell bridge over the River Liffey. At the end of the bridge, Sackville street, the principal street of the Irish capital, begins and runs north. Just beyond the end of the bridge is the O'Connell monument, and farther north you see the famous Nelson monument. The building with the pillars, which projects into the street on the left-hand side between the two monuments, is the Postoffice. Sackville Street is sometimes also called O'Connell street.

Then when James II was driven from England in 1689, Ireland supported him because of his efforts in behalf of the Catholic religion. But with the aid of the Protestant north and an English army, William of Orange—who had become William III of England—defeated James at the famous Battle of the Boyne (1692). This meant the triumph of Protestant Ulster, or the "Orangemen," who for a century and a half then held almost all power in Ireland. Catholics were debarred from voting or holding office, and even from educating their children in their own religion. Catholic church services were forbidden under penalty of death. The result of such persecution was to intensify the Catholicism of Ireland and to sow broadcast the seeds of lasting bitterness.

At the very end of the 18th century Ireland was bribed into giving up its separate Parliament by the Act of Union with Great Britain (1800), but thenceforth it had representatives in the British House of Lords and House of Commons. In 1829 the last of the important laws against Catholics—excluding them from Parliament—was repealed (*see* O'Connell, Daniel).

Next, in 1845 a blight destroyed the potato crop, and there followed the terrible sufferings of the famine years 1846–47. England suspended and then repealed the "Corn Laws" which hindered the free importation of grain, but thousands died, and millions emigrated. From that time on the people have been leaving Ireland for other lands, until today it is said that there are four times as many Irish in America as in Ireland itself. Before the great famine Ireland had a population of more than 8,000,000, but today its people number only about half what they were some 80 years ago.

THE SEAT OF THE "BLARNEY STONE"



This is the famous Blarney Castle, near the city of Cork. As you doubtless know, there is a stone set in the wall of the building, which according to tradition confers remarkable powers of persuasion upon anyone who kisses it. The Castle was built in 1449 by Cormac McCarthy.

A GLIMPSE OF KILLARNEY'S FAMOUS LAKES



Here you see a portion of the famous lakes in the southwest of Ireland. The lakes lie in a beautiful natural basin, hemmed in by mountains, and are studded with finely wooded islands, many of them crowned with picturesque and historic ruins.

The last part of the 19th century saw a belated effort on the part of English statesmen to undo old wrongs in Ireland. A law passed by Gladstone (1869) forced the English church in Ireland to give up its position as a state church. The rights of tenants were safeguarded (*see* Parnell, Charles Stewart) and money was spent freely to develop the resources and farming of Ireland and to enable the peasants to purchase their holdings. In 1886 and 1893 Gladstone attempted to restore Home Rule to Ireland, but even his great name could not carry the measure through Parliament. In 1898 the Conservative party gave Ireland a great measure of local self-government, and many other measures helped to improve social and economic conditions.

But the Irish continue to demand Home Rule. In 1912 Asquith brought into Parliament the third Home Rule bill, in spite of the Conservative party cry that "Ulster will fight, and Ulster will be right!" Ulster feared that an all-Irish Parliament would discriminate against its religion and against its industry, and Ulster disliked also to give up its privileged position in Ireland. In spite of "gun-running" and open preparations for armed rebellion by Ulstermen, the Home Rule bill became a law, just as the World War broke forth in the summer of 1914. Its operation was necessarily postponed during the war, and John Redmond, the conciliatory leader of the Irish Nationalists, died in 1918 with Ireland's hopes unfulfilled.

The attempt of Sir Roger Casement to bring German aid to Ireland (for which he was condemned and shot) and the ruthless trial and execution of 14 leaders of the unsuccessful Easter Rebellion of 1916, further widened the breach between England and Ireland. Leadership more and more fell into the hands of the Sinn Fein (*shĭn fān*, meaning "ourselves alone"), an Irish revolutionary party which proclaimed Irish independence, organized an Irish Parliament (composed of Ireland's members elected to the British House of Commons), and openly tried to make Ireland an independent republic. On the one side a policy of arson and assassination of police was followed; on the other, one of burning houses and villages and the shooting of suspects by the military forces which recalled the worst atrocities in Belgium. The passage by Lloyd George of a new Home Rule bill, establishing one Parliament for Ulster and another for the rest of Ireland, satisfied nobody. Never before in history was the Irish question quite so acute and dangerous.

The Ulster Parliament was opened, however, in 1921; and a conference was arranged in London between Irish republican delegates and members of the British Cabinet. After negotiations extending over nearly three months, a treaty was signed on December 6th giving Ireland full dominion status in the British Empire, under the name of the Irish Free State, with a Parliament and executive of its own.

contained in the Easy Reference Fact-Index at the end of this work



The FAIRY CALF of TIPPERARY

"Looking up he saw a great black cat standing between him and the moon, on the tip of its claws, with its back up, as it mewed with the voice of a watermill. Pretty soon the cat swelled up . . ."

IN Tipperary is a hill shaped very much like a peaked nightcap. Near the top of it is a pasture where once upon a time a herdsman watched over his cows. Now this hill had long been a playground for the fairies and they loved it for the velvety grass and the broad-leaved bushes on which they could dance. The Little People were angry indeed when cows trampled on it and ate the green carpet right off their play place. Even the lowing of the herd sounded sad in their ears. Something had to be done about it or the fairies would have no spot to meet on moonlight nights. So the Fairy Queen decided to frighten away the stranger and the great beasts with long horns, sharp hoofs, and bells that sounded like big church bells to a fairy.

Night after night while the moon shone brightly on the hill the Fairy Queen would suddenly bob up before the lonely herdsman, now in one frightful shape and now in another. For a Fairy Queen can do just such things. Sometimes she would be a great horse with eagle wings and a dragon's tail; then quick as a flash she would turn into a little lame man with a flaming bull's head. Then she would be a terrible ape with a turkey's tail and duck's feet, with such roaring, hissing, bellowing, or howling as was never heard in this world before or since. And the poor herdsman, who could neither stir nor close his eyes, had to watch these horrible sights until his chattering teeth almost fell out of his mouth, and his hair lifted his hat almost half a foot from his head. And the poor cattle scrambled about like mad until the sun rose over the hill. Then the Fairy Queen would go away.

Never a night passed but that the same thing happened. The cattle, half-mad, kept falling into pits or tumbling into the river. And no herdsman would tend them at night, even when the farmer who owned them offered ever so much money. But the fairies were happy, for now on moonlit nights they could come back to dance and gambol, to sip dewdrops from acorns, and to spread fairy feasts on the heads of mushrooms.

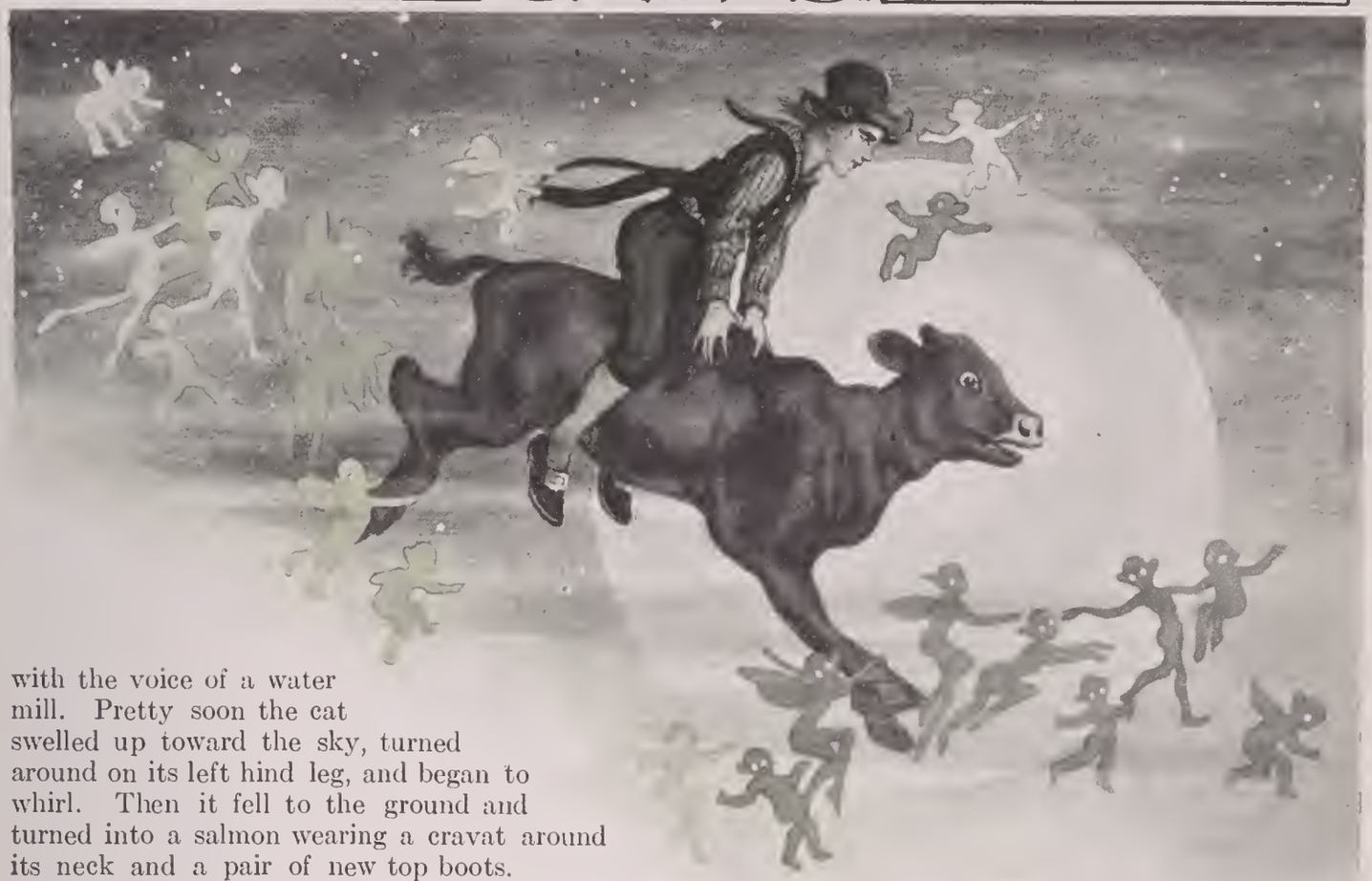
One day the farmer told his troubles to Larry Hoolahan, who feared nothing, and who played on the pipes better than any other player in all Ireland roundabout.

"Shure, an' if that is what ails you," said Larry, "just make your mind aisy. Were there as many fairies there as potato blossoms in Tipperary, I would not fear to face them. A quare thing, it would be if I who never feared a grown man should run from a fairy brat not the bigness of a thumb!"

"Whist, Larry," said the farmer, glancing cautiously around him, "do not talk so bold! But if you watch my herds for a week on yonder hill you shall sup from my broth until the sun has burned itself down to the bigness of a farthing rushlight."

After striking the bargain, Larry hurried to the hilltop just as the moon was beginning to peep over its brow. Seating himself on a big stone with his back to the wind he began to play on his pipes. Presently Larry heard the voice of fairies upon the breeze, and one of them saying with a laugh: "What! Another rash man upon our fairy ring! Go, Queen, and make him repent!"

Then Larry felt them flying past his face like a swarm of midges, and looking up he saw a great black cat, standing between him and the moon, on the tip of its claws, with its back up, as it mewed



with the voice of a water mill. Pretty soon the cat swelled up toward the sky, turned around on its left hind leg, and began to whirl. Then it fell to the ground and turned into a salmon wearing a cravat around its neck and a pair of new top boots.

"Come along, there!" said Larry. "Dance, and I'll pipe!"

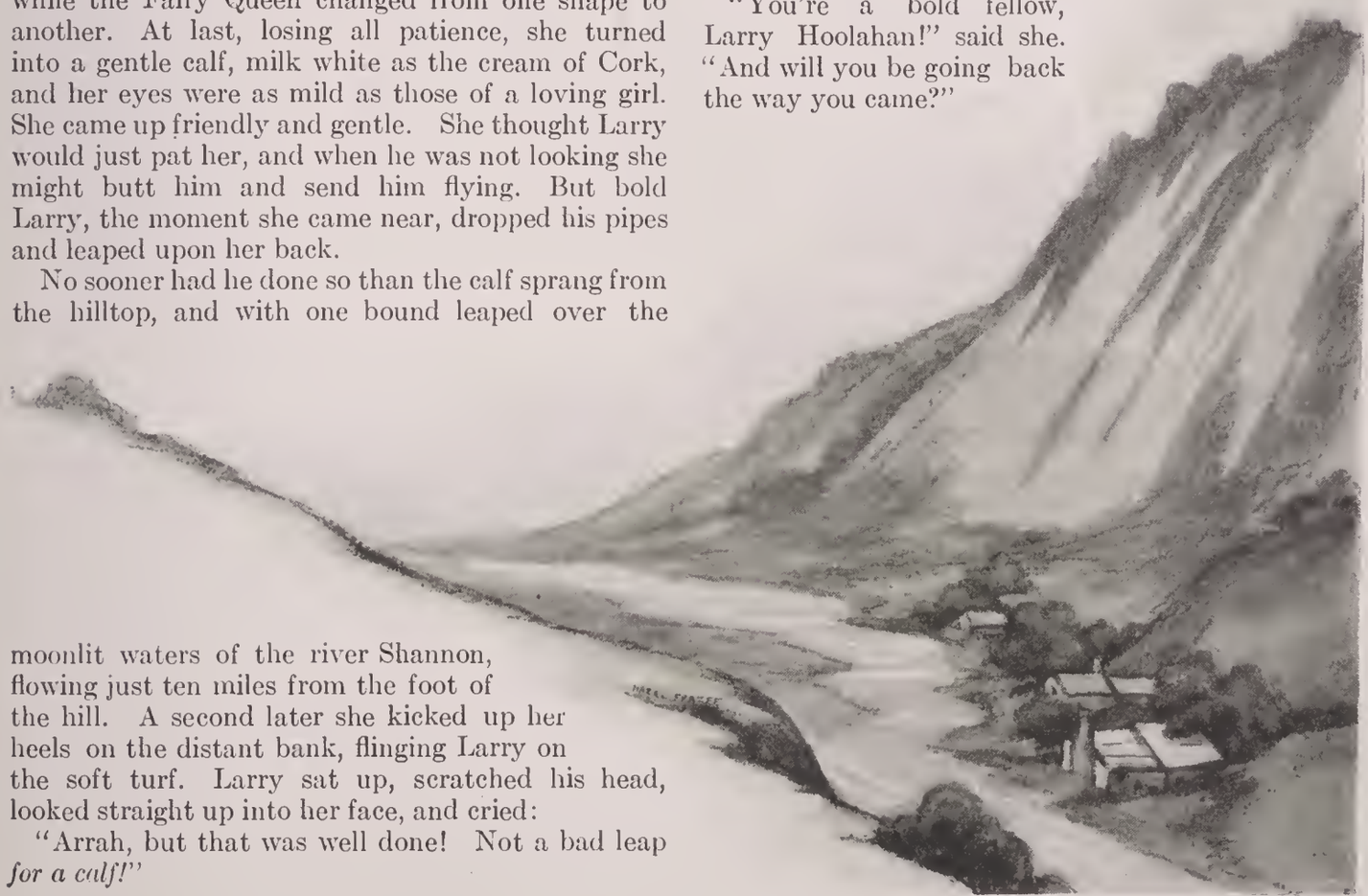
And he began to play as well as he knew how, while the Fairy Queen changed from one shape to another. At last, losing all patience, she turned into a gentle calf, milk white as the cream of Cork, and her eyes were as mild as those of a loving girl. She came up friendly and gentle. She thought Larry would just pat her, and when he was not looking she might butt him and send him flying. But bold Larry, the moment she came near, dropped his pipes and leaped upon her back.

No sooner had he done so than the calf sprang from the hilltop, and with one bound leaped over the moonlit waters of the river Shannon, flowing just ten miles from the foot of the hill. A second later she kicked up her heels on the distant bank, flinging Larry on the soft turf. Larry sat up, scratched his head, looked straight up into her face, and cried:

"Arrah, but that was well done! Not a bad leap *for a calf!*"

The calf looked at him, then turned into the Fairy Queen.

"You're a bold fellow, Larry Hoolahan!" said she. "And will you be going back the way you came?"



"That I will, if you'll let me!" cried Larry. So the Fairy Queen changed into a calf again. Larry leaped upon her back. Another bound and they were on the hilltop once more.

"Much courage have you shown, Larry Hoolahan," said the Fairy Queen, again changing into her own shape. . "And never more shall you be troubled by me or my fairies, while you keep the herds on this hill. The day now dawns, but if I can ever serve you, let me know." Then she vanished.

During Larry's lifetime she never visited the hill again. And Larry, piping, eating, drinking at the farmer's expense (and now and then watching the herd), never bothered the Fairy Queen with requests. At last he died, and was buried in the green valley of Tipperary. But whether the Little People came back to the hill after his death, is more than I can say.

IRIS. The bright colored flowers of the larger blue flag are found in the early summer swaying in the breeze on their long slender stems along the banks of the rivers and lakes from the Atlantic coast to the Mississippi River. Longfellow says of them:

> Born in the purple, born to joy and pleasance,
> Thou dost not toil nor spin,
> But makest glad and radiant with thy presence
> The meadow and the lin.

Although the flag, which gets its name from the fact that it sways in the breeze like a banner, is the most common form of the iris found in America, there are 170 species, ranging in color from white and yellow to deep blue and purple. Indeed, to its varied and showy hues the flower owes its name, for Iris was the Greek goddess of the rainbow who carried messages between the gods and men.

From a white form of the iris which grows in southern Europe was derived the heraldic device of the fleur-de-lis, which Louis VII of France adopted in the 12th century as the emblem of the French royal house. The fragrant orris-root, much used in making tooth powder and pastes, is derived from the rootstocks of the Florentine species.

The flower of the iris has a petal-like division consisting of three distinct sets of three petals each. The long narrow pointed light green leaves and the flower stems each bearing a single blossom rise from a rootstock which is covered with numerous fibrous rootlets. The iris grows wild in damp, fertile places, but many varieties are cultivated and grow well in good free garden soil. The favorite species in cultivation is the Japanese iris (*Iris laevigata*), and the most common wild varieties are the larger blue flag (*Iris versicolor*), and the slender blue flag (*Iris prismatica*).

IRISH LITERATURE. For centuries before English became the dominant language in the British Isles, and for centuries after, the people of Ireland spoke and wrote a language of their own. This language, known as Irish Gaelic, is a sister tongue of Scotch Gaelic and Manx (spoken on the Island of Man), and belongs to the Celtic branch of the Indo-European family (*see* Philology). It is a highly inflected tongue, rich and varied in its forms. Its nearest relatives are the so-called "Brythonic" languages, including Welsh, Cornish, and Breton.

In this beautiful ancient language the imaginative Celts developed an extensive literature long before the Anglo-Saxons, the Germans, the Scandinavians, and the other peoples of western Europe. Their stories of gods and heroes—of Cuchulain and his brave deeds, of the fair Deirdre and her sorrows, of Finn and Ossian, of the Shee (fairies) and other supernatural beings—were handed down by word of mouth, as among all primitive peoples, for generations before they were put in writing. The earliest manuscripts have long since perished, but some have been found dating from the 7th century. The most celebrated story of Irish antiquity is the epic or saga called the 'Táin Bó Cúalnge' or the 'Cattle-Raid of Cooley', in which the youth Cuchulain, champion of Ulster, is represented as holding at bay single-handed the allied forces of Ireland. This curious old tale, like many others of its kind, is written in prose, interspersed here and there with verse.

Wit and Fancy; Joy and Sadness

Because of their isolation in the early years of their history, the Irish were able to develop a highly individual language and literature. In it they expressed their love of nature, their mysticism and dreamy fancy, their melancholy and joy; their intense love of country, and their inimitable wit and humor. In the course of the 19th century the old national tongue fell into disuse and almost died out, but of recent years persistent efforts have been made to restore it as both a literary and a spoken tongue, largely through the efforts of the Gaelic League, organized in 1893.

There had already sprung up a new Irish literature, written in English but preserving the Irish spirit and making use of the Irish traditions. At the opening of the 19th century came the 'Irish Melodies' of Thomas Moore; then a little later the beautiful lyrics of James Clarence Mangan, Sir Samuel Ferguson's 'Lays of the Western Gael', and many others. In fiction there has been a long line of brilliant writers, of whom Samuel Lover (1797–1868) and Charles Lever (1806–1872) are the best known.

The Irish Literary Revival

In the last generation there has been a powerful movement, known as the Irish Literary Revival, to create a distinctively national Irish literature. Among the chief figures in this revival are William Butler Yeats, who in his poems, dramas, and essays has brought back much of the magic beauty of Celtic legend; and George W. Russell ("Æ"), another mystic poet and essayist who finds in the ancient lore of his native land "the music of an eternal joy." Lady Augusta Gregory, through her practical ability as well as her literary talent, has done much to make the Irish Literary Theatre (founded in 1899) a success. John Millington Synge, whose early death cut short a career of splendid promise, was the dramatic genius who got closest of all to the soil of Ireland and who came nearest to depicting the heart of the Irish peasant. (*See* Drama.)

The MIRACLES of IRON and STEEL



IRON, often wearing the name and form of steel, has built more roads than the Roman, higher towers than the Babylonian, more marvelous devices than ever were fashioned by the magicians of the Arabian Nights. Iron has shackled the strong genie steam, and forced him to toil, day in, day out, at the smallest and most trivial, the greatest and most terrible tasks—has made him spin our thread, weave our garments, and run swifter than the wind under burdens that would stagger an elephant. No less subtle than strong, iron has helped to snare the swift and deadly lightning and make it light our houses, carry our messages, and patiently perform a hundred homely tasks.

IRON AND STEEL. The vast pageant of modern industry, going on day after day, reaches a splendidly dramatic climax in the manufacture of iron and steel. The strange landscape of a somber ironworking district, with its long funereal coal sheds and slag piles, and its towering colonnades of blast furnaces, flying streamers of smoke by day and flaring banners of flame by night, gives a sense of turmoil and power as of the work of oppressed Titans.

Within the great buildings momentous things are taking place. We enter a long shed like a dusky cavern; the cliffs lining one side are the open-hearth furnaces—so called, though the billows of seething steel within can be seen only through portholes. From a ledge on the canyon's side we watch a great bowl (called a ladle, but shaped like a Chinese teacup without a handle) placed below the spout of the furnace to be tapped. Now the plug is removed, and the dim vault of the building lights up with the glare from the fiery liquid steel streaming into the huge teacup, and the shower of sparks spattering up from it. The cup fills, overflows, and a bubbling fiery white-hot cream spills over to curdle into black slag on the floor below. Next a huge crane traveling on overhead rails moves quietly over to the ladle, picks it gently up by its two projecting ears, and carries it, with its 70 tons of molten steel, over to a row of ingot molds on the other side of the canyon, as easily as you might carry a cup of coffee.

Or in a Bessemer steel mill we might see an even more gorgeously impressive sight. A huge iron caldron, like a gigantic swollen frog, bows its head to be fed with its white-hot ration, then rears up on its haunches, growling, spitting and vomiting a great blast of dazzling flame. How anxiously the monster's gnomelike servants watch its moods! A sense of nerve-racking tension and suspense, as at the crisis of a battle, broods over the "blow"; and well it may. Not only is real peril to life and limb ever present; this is also the birth of the giant of modern industry—steel.

Steel is a combination of iron usually with carbon, and is the form assumed by the metal when it does its mightiest works. Twentieth century civilization is built on iron, almost always in the form of steel. Steel ships carry us across the ocean; we ride in steel cars drawn over steel rails by steel and iron locomotives; our great office buildings have steel skeletons; and steel needles make our garments from cloth woven by steel machinery. Steel and iron machinery is at once our servant and our master.

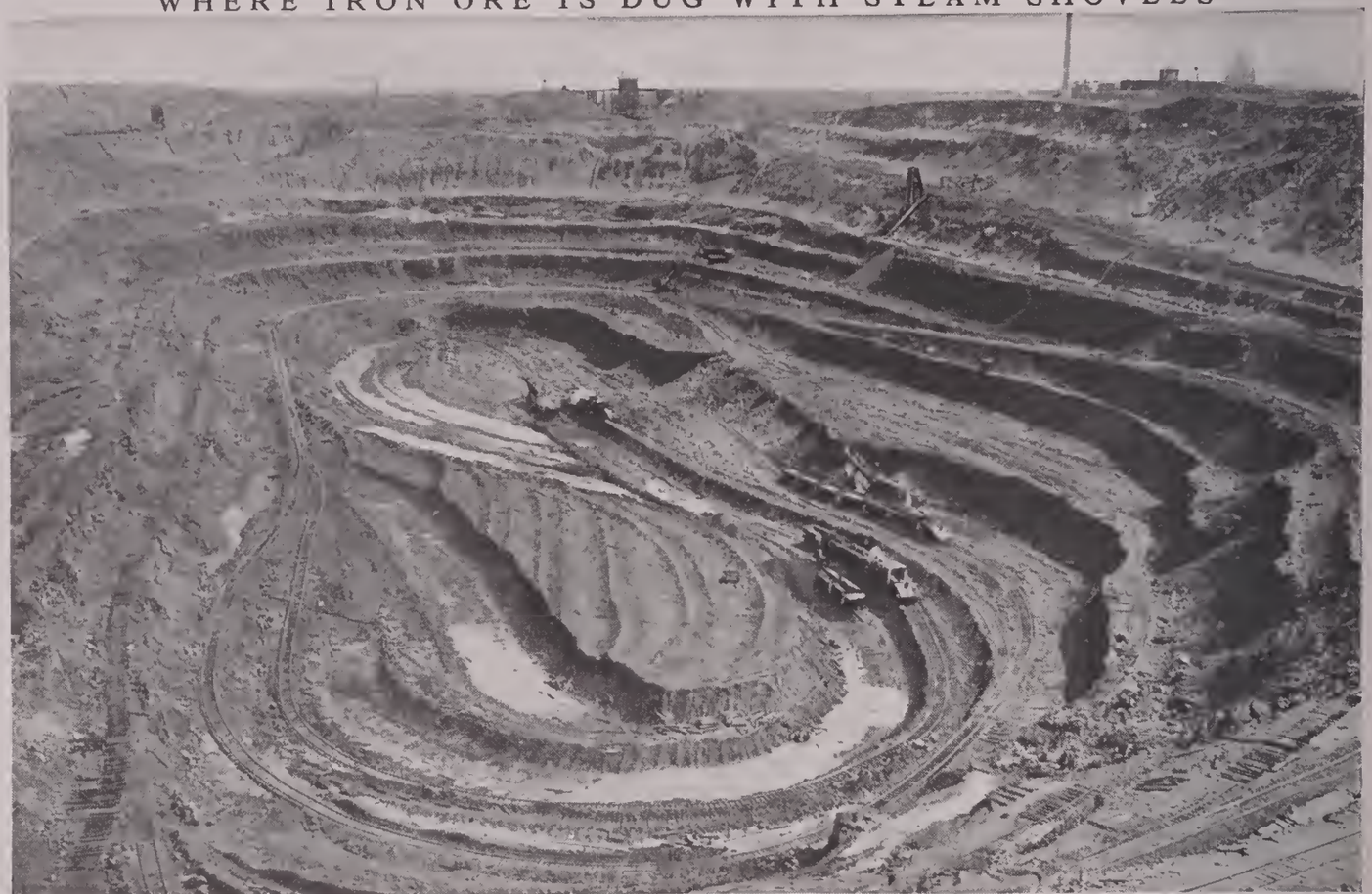
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The ancients and the alchemists of the Middle Ages called gold the king of metals. Kings count for little nowadays, and iron wields the sovereign power. The story of iron and its helpmeet coal is at once a fairy story and the story of modern civilization.

What is iron? It is one of the commonest of the 90 chemical elements of which the world is made, for only oxygen, silicon, and aluminum occur in greater abundance. Iron, in combination, has been calculated to make up about five per cent by weight of the earth's crust; though some have surmised that oxygen make rust, or red oxide of iron. Hence, while iron does not refuse to make close friendships or combinations with many other elements, the oxides and other combinations into which oxygen enters are the most important iron-containing substances in nature. You may see iron and oxygen in the red dust and clay of the road, in the red brick of houses, in many red paints, in red autumn leaves, and in the red cheeks of a healthy child.

Iron is adroit and versatile, changing its very nature according to circumstances and the company

WHERE IRON ORE IS DUG WITH STEAM SHOVELS



This picture shows you one reason why the United States is so great an iron-producing country. This is one of the open mines of the Mesabi Range in Minnesota, where the ore is so close to the surface that after the top soil is stripped away the ore may be loaded directly into cars by steam shovels. Thus an abundance of ore is obtained at comparatively low cost.

the unknown depths, if we could explore them, would show a larger proportion of iron. It enters into most rocks and earths, the chlorophyll of plants, and the blood corpuscles of animals.

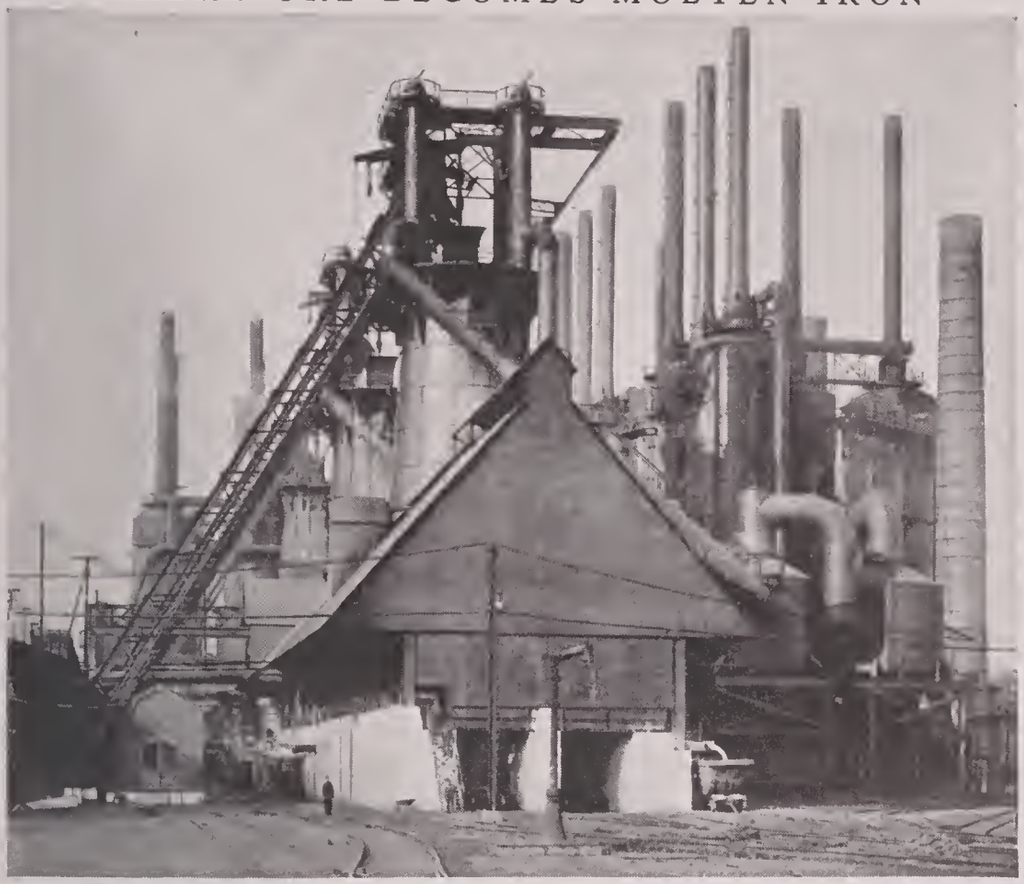
And yet pure iron is scarcer than gold or diamonds. It is rarely found in nature except as a visitor from other worlds in the form of meteorites; it is unknown commercially, and is difficult to obtain even in the laboratory. Probably you never saw the silver-white metal, pure iron.

Why? Because iron has a plebeian temperament. While the "noble metals" maintain an aristocratic exclusiveness which protects them against rust or tarnish, iron is passionately fond of society, especially that of oxygen, which cleaves to it closer than a brother. In other words, iron has a strong tendency to rust if exposed to air and damp, for iron and it keeps. It is a dozen metals in one; now almost diamond-hard—and again almost as soft as copper; here brittle as glass—there malleable as silver; now welding readily—again, absolutely refusing to weld; melting rather easily—and at other times quite infusible; usually very magnetic—and again almost non-magnetic; an excellent conductor of heat and electricity—and at times stubbornly resistant to both. For range of adaptability, iron stands alone.

Because uncombined iron is practically unknown in nature, primitive man used stone and bronze instead of iron for his weapons and tools. Gold and copper were worked long before iron, which has to be released from the grip of other elements in order to take the metallic form. But long before history began to be written, some lucky savage, happening on a windy day to back an excessively hot fire with

pieces of iron ore, found a lump of strange metal in the coals, and was inspired to pound its red-hot mass into shape between two stones. He thereby gained not only a very superior spearhead or sword, but much prestige among his fellows. The tales of divine smiths in many lands show the awed esteem in which the new craft was held. Magic went to the forging of mighty swords like King Arthur's Excalibur, Siegfried's Balmung, and Roland's Durandal. The uncanny metal itself, appearing so mysteriously, manifesting such terrible powers, has magic qualities in many old tales.

WHERE ORE BECOMES MOLTEN IRON



Here is a battery of blast furnaces, where iron is melted from ore. The furnaces rise from the shed, and the inclined tracks at the left deliver ore and fuel into the top of these furnaces. To the right of the shed are dust-catchers and the stoves which heat the air used in the furnaces. At the right-hand corner of the shed a tank on wheels is receiving molten slag.

Something like this accidental discovery must have happened in many countries at one time or another. Among the peoples of the Mediterranean and the lands immediately eastward, iron seems to have been first extensively worked and distributed by the Hittites of Asia Minor, from whom the Assyrians learned its use. The terrible might of the conquering Assyrian army was largely due to the fact that it was the first to be equipped with iron weapons. From that time forth "iron, cold iron, is master of them all, in war and in peace."

During ancient times and the Middle Ages, the highest output of a furnace was three or four tons of iron a week. Four loads of timber were required to make each ton of pig iron, and three additional loads to convert the pig into bar iron; and it took at least two weeks more—not to mention the additional fuel—to convert the iron bars into steel. Clearly, iron and steel were then too precious for any but the most necessary uses.

Today our whole civilization is woven over a framework of iron and steel. The Age of Steel is the result of many innovations, discoveries, and inventions, some the evolution of centuries, the greater number the product of the last 200 years. The most epoch-making of all—the Bessemer-Kelly and open-hearth processes of making steel—are less than 75 years old. All these are methods of rapidly increasing the amount of steel and metallic iron in the world.

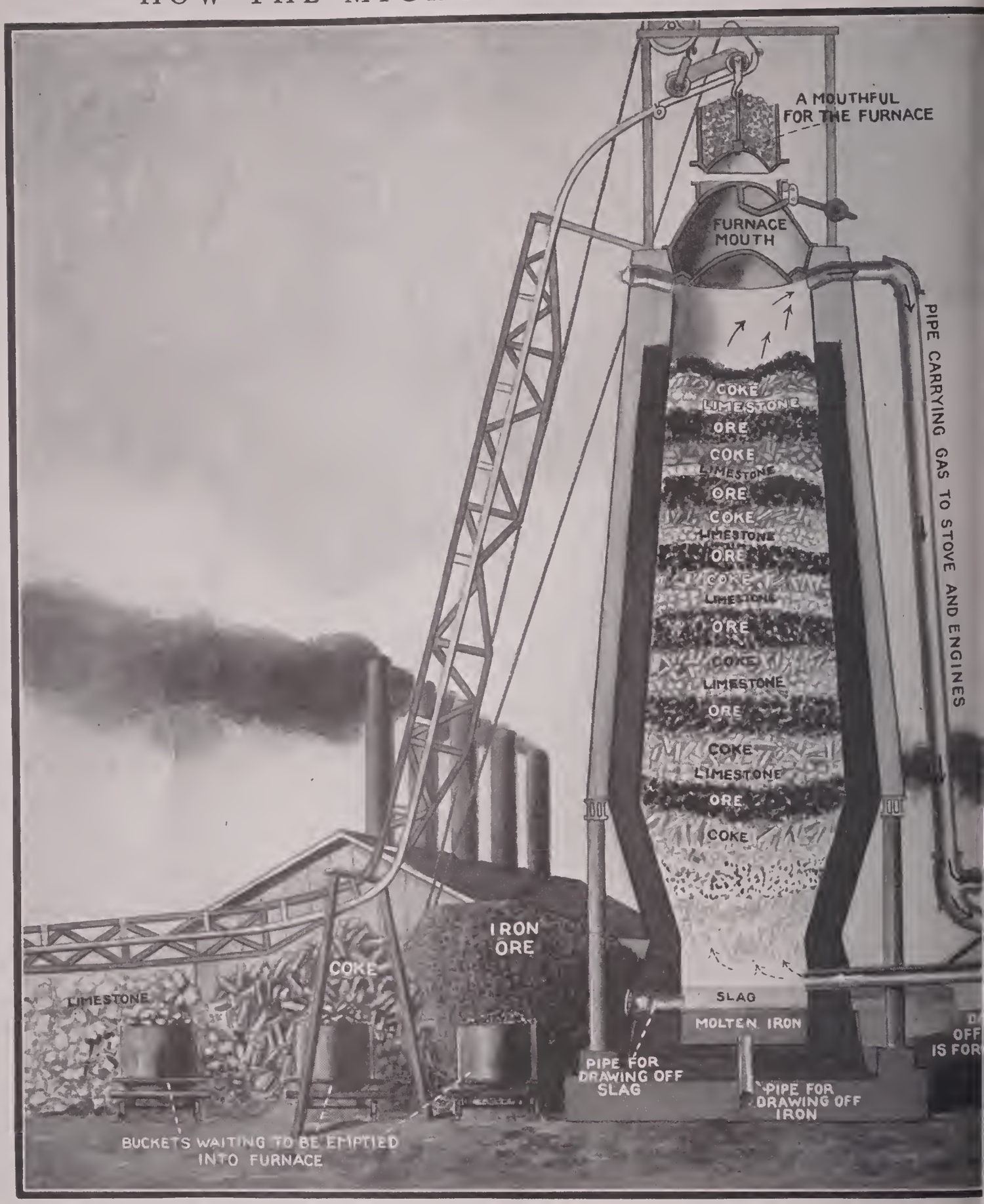
The bulk of our commercial iron is produced from four ores, the most important being oxides (hematite, magnetite, and limonite) and one (siderite) a carbonate.

Hematite is the most widely distributed and important ore and is the kind produced in the great Mesabi range of Minnesota. Most of it looks like soft red earth. Iron carbonate or siderite is a hard crystalline gray or brown ore that can be profitably worked only when local fuel conditions are favorable. Iron pyrites (a compound of iron with sulphur), often called "fool's gold," is used in enormous quantities in making sulphuric acid. Other iron-bearing minerals occur, but are unimportant as sources of iron.

The ores are generally mixed with impurities, such as silica, alumina, and lime. A rich ore contains more than 50 per cent of iron; an average ore, from 35 to 50 per cent; a poor one, workable under favorable conditions, from 25 to 35 per cent. Ores containing less than 25 per cent of iron are at present considered entirely useless.

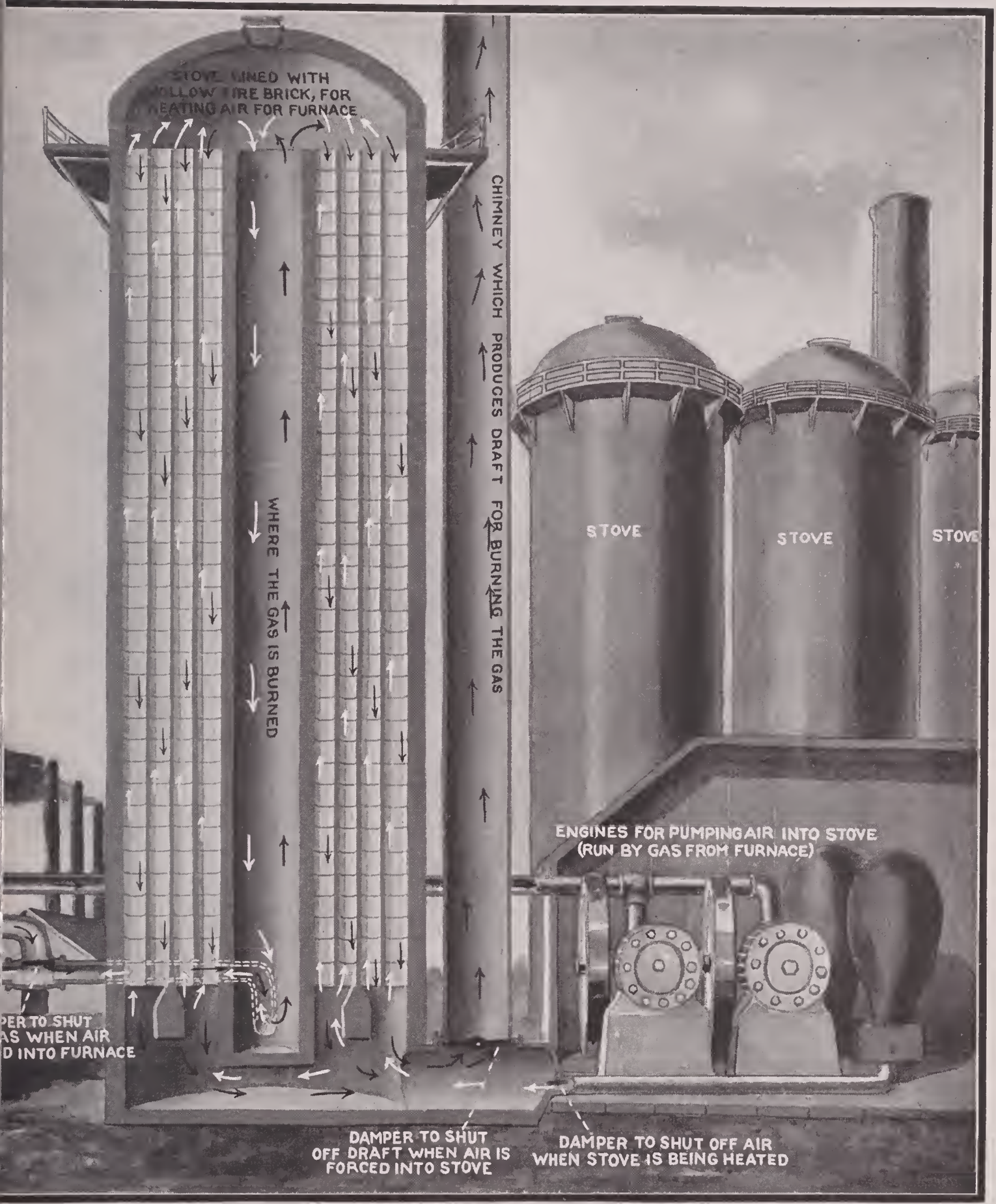
Iron ores are very widely distributed over the face of the earth. The United States is at present the leading ore-producer and consumer, producing about two-fifths of the world's total output. Iron is produced in about 28 of the American states. The world's greatest iron-mining center, producing about four-fifths of this country's iron ore output, is the Mesabi district at the head of Lake Superior. Vast deposits of this ore lie in open-pit mines, from which the soft ore can be scooped up like sand by steam shovels that pick up two tons at each shovelful. The

HOW THE MIGHTY BLAST FURNACE



In this drawing a blast furnace is shown as though it had been cut in two from top to bottom. It is simply a wide chimney, lined with fire brick. Coke, iron ore, and limestone are brought up the inclined track and dropped in alternate layers through the door at the top. When melted, the limestone and the impurities in the ore combine to form slag, and both the slag and the iron sink to the bottom. The slag, being lighter, floats on top of the molten iron, and both are drawn off at intervals through the drain pipes. The necessary ingredients are fed in constantly, in order to keep the furnace in continuous operation. So that no heat may be wasted, the furnace is supplied with heated air. The air supply and exhaust system which do this are explained on the next page.

For any subject not found in its alphabetical place see information



It takes several huge stoves to supply heated air for the blast furnace. One of these is shown in cross section above. A central flue opens into a chamber on top and from this chamber channels lead through fire-brick to another chamber at the bottom. At first hot gases from the furnace, represented by black arrows, enter the central flue, rise, and pass down through the side channels, heating the fire-brick. At the bottom they discharge through a chimney. Then dampers close the chimney and shut off the gas as shown, and air represented by white arrows is pumped the other way by the engines at the right. It is heated in the side channels, passes down the central flue, and enters the bottom of the blast furnace. Meanwhile the hot gases are heating another stove.

contained in the Easy Reference Fact-Index at the end of this work

labor cost of digging may average 16 cents a ton, or run as low as 4 cents a ton. The Great Lakes furnish an incomparable water highway from Duluth to Chicago, Gary, Ashtabula, or Pittsburgh; and the giant ore locks and labor-saving machinery have reduced the cost of loading and unloading to a few cents a ton.

Outside of the United States, the most important ore-producing region is the Lorraine-Luxemburg district, on the borders of France, Belgium, and Luxemburg. It was largely the acquisition of part of the Lorraine iron mines at the close of the Franco-German War (1871) that enabled Germany to attain its manufacturing and military greatness. The loss of these ores through the return of Alsace-Lorraine to France in 1918 was a very serious loss to German industry. The invention of the basic Bessemer process gave the Lorraine ores, both German and French, new importance in steel-making. The British iron works now import most of their ores from other countries, particularly Spain and Sweden. Swedish Lapland, Canada, Cuba, Mexico, South America, India, and China have large deposits of iron ore, which as yet are only slightly developed.

WHERE THE LIQUID METAL TURNS TO "PIG IRON"



The huge ladle has just come from the blast furnace, and is pouring molten iron into molds. The molds are mounted on two parallel conveyor belts and these belts move slowly beneath that double "distributor" under the spout, so that each mold receives a full load. While moving along the belts, the iron cools into solid ingots called "pigs."

How Iron is Changed into Steel

In smelting ore to produce iron, it is necessary to accomplish three things—get rid of the impurities with which the iron oxides are mixed; release the iron from the oxygen with which it is combined; stiffen the soft iron by mixing it with just enough carbon. The whole is accomplished at once in the heat of the blast furnace—the first by the lime, the second and third by the carbon of the fuel loaded into the furnace with the ore.

The modern blast furnace is a great tower or chimney, sometimes more than 100 feet tall, which widens from the bottom and tapers again toward the top. Near the bottom, pipes admit the forced draft or "blast" which gives the furnace its name. The iron ore, mixed with coke and broken limestone, is hoisted to the top and dropped in on the blazing fire, whose heat is intensified by blasts of hot air. When they attain the terrific temperature of 2,800° to 3,000° F., the iron and the oxygen of the ore separate, the released oxygen combining with the carbon of the fuel and passing off as carbon dioxide gas, while the molten iron, holding a little dissolved carbon, drips down to the very bottom of the hearth like fat frying out of a roast. The calcium of the limestone flux seeks out the earthy impurities of the ore and unites with them to form a glassy scum or "slag," which being lighter than the molten iron swims just above it. From time to time a fresh charge of ore, fuel, and flux is added, the furnace being kept burning night and day, seven days in the week; to let it go out would be a costly calamity. Periodically the molten slag is drawn off through the "cinder notch"; and at intervals a lower hole is tapped to draw off the glowing golden-red iron. In old-fashioned blast furnaces the molten iron was drawn off directly into sand molds or troughs which bore a fancied resemblance to a family of little pigs lying alongside their mother and feeding. Hence the term "pig iron" was applied to the product of the blast furnace.

In modern practice the liquid iron is frequently rushed to the steel mill to be made into steel before it cools or to the "pig" casting machine which today supersedes the old sand molds. Whether it ever becomes a "pig" or not, the product of the blast furnace is called "pig iron," the intermediate or semi-raw material from which practically all our iron of whatever kind—cast iron, wrought iron, or steel—is made.

Before the invention of the blast furnace iron was smelted in small forges which used charcoal as fuel. The iron was seldom completely melted so that the metal could be poured and cast; but it was kept red hot and hammered into shape as wrought iron. The growing scarcity of wood for making charcoal for a time checked the growth of the iron industry, but about 1735 the step was taken which made possible our modern furnaces, producing 400 to 800 tons of

IT GOES IN AS IRON AND COMES OUT AS STEEL



After hours of exposure to intense heat in the open hearth furnace, which is the brick structure in the background, iron becomes steel. When the transformation has reached the desired point, a clay plug in the drain-pipe is broken, and the molten steel runs out into the huge ladle, or cylindrical bucket, which you see to the right. The slag comes also, and flows off the top of the ladle into the conical receptacle at the left.



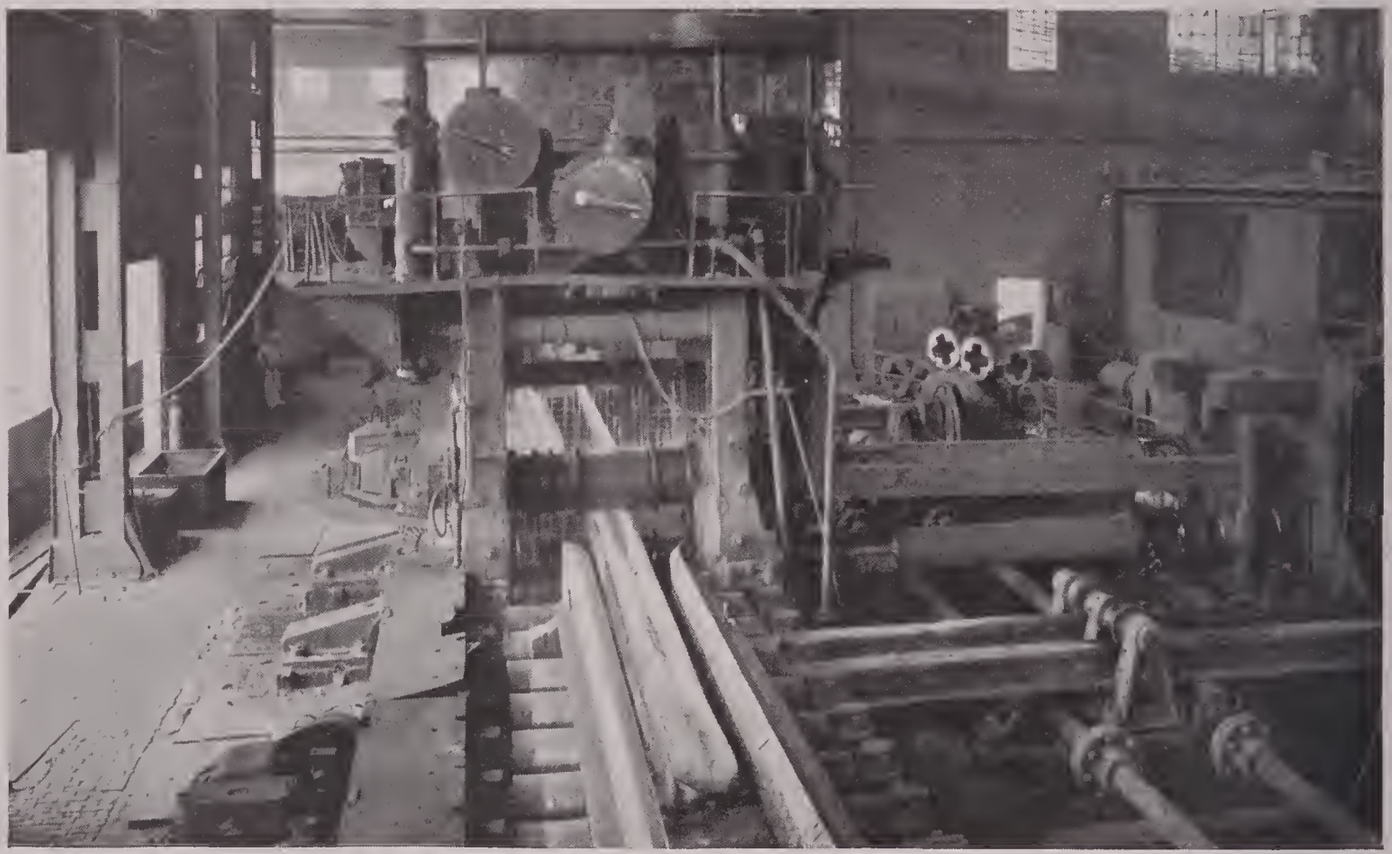
Huge hooks suspended from a traveling crane seize the ladle when it has been filled with molten steel at the open hearth furnace and swing it into line over a row of molds. A box equipped with one or more nozzles is placed beneath the ladle, and the ladle's vent is tapped. Thereupon the steel runs out into the molds, and cools into oblong ingots.

contained in the Easy Reference Fact-Index at the end of this work

STARTING TO MAKE AN INGOT INTO RAILS



This picture shows the "soaking pit" process, which is necessary at the outset of rail-making because when the ingots arrive at the mill, they are not hot enough to be rolled. The first step therefore is to place them in upright covered furnaces known as "soaking pits," and there they are brought to the proper temperature. When this has been done, the lid of the furnace is removed, huge nippers drop down from a traveling crane, withdraw a heated ingot and take it to the "blooming" mill, where the actual rolling of the ingots commences.



Here the blooming mill is starting to make a rail. Streams of water keep the rollers cool, and the top roller is movable. At first the rollers are set almost the thickness of the ingot apart. Then as the ingot passes back and forth the distance is lessened, until the ingot is reduced enough in thickness to go into the rail-rolling mill. In this condition it is called a "bloom" or "billet."

For any subject not found in its alphabetical place see information

WHERE RAILS ARE TURNED OUT BY THE THOUSAND



This picture gives only a faint idea of how spectacular a process rail-making really is. When the hot "billet" comes from the blooming mill, it is shot through a powerful roll, is squeezed down in size, and emerges upon a bed of rollers such as the one you see here, in the form of a long writhing snake of glowing hot metal. From bed to bed and roll to roll this long strip shoots at high speed, until finally it is shaped and goes to the saws to be cut into rail lengths. The entire process is one of the most fascinating to watch in the whole steel mill.



The final manufacturing process in the story of the steel rail is shown here. After the rails leave the saws, they go to a cooling bed, where they remain until they have become cold. Then they are brought to these powerful presses, which straighten out the bends and kinks that they acquire as a result of being tossed about while red-hot. After the press operator is satisfied that they are straight, they are dragged off onto racks as you see, and they are then ready for inspection and shipment to the railroads.

iron against the 10 to 100 of the old forges—the substitution of coke from bituminous coal, in place of charcoal, as fuel.

Cast iron, wrought iron, and steel are all mixtures or combinations, in varying proportions, of iron and carbon. The differences among them might once have been very simply stated in this way:

Cast iron has a high percentage of carbon—usually about 3 or 3.5 per cent. It melts at a lower temperature and flows readily into molds, becoming brittle when cold. It is cast into stoves, radiators, and machine parts which do not have to withstand severe shocks and strains.

Wrought iron has had most of the carbon burned out, leaving not more than 0.3 per cent. It does not melt as readily as cast iron, and when heated it can be hammered into shape. It is tough and strong, though not so strong as steel; it welds easily and bends before it breaks. It has many industrial uses, as for chains, anchors, rivets, and bars; but its field is constantly being restricted by the increasing cheapness of steel.

The Sensitive "Temper" of Steel

Steel, until our own time, was iron containing less carbon than cast iron (not more than 2 per cent) and more carbon than wrought iron. Its distinguishing property, historically, is that it can be made hard and brittle or tough and malleable at will, by careful "tempering"; that is, by heating to a cherry-red, then suddenly cooling—in water, oil, air, or some special bath.

Now, all these definitions are still true of types of iron and steel, and may well be remembered as such; but the addition of new members to the cast-iron and steel groups has crisscrossed the family characteristics confusingly, and made necessary enlargements of the old definitions. A malleable cast iron is now produced by annealing. It resists battering and shock, is nearly as strong as mild steel, and, because of its cheapness, is much used in railroad car castings, reapers, binders, pipe fittings, etc. The Age of Steel was created by new steels which meet the old definition with difficulty or not at all; that is, by so-called mild and medium steels which contain so little carbon that they can never be made hard. In fact, the name of "steel" is now generally applied to any malleable iron obtained from the liquid state, regardless of the amount of carbon it contains. The ancient steel is thus relegated to a subordinate class as "high carbon steel."

A Great Field for the Chemist

We have spoken as yet only of iron and carbon, but many other elements—especially silicon, manganese, sulphur, and phosphorus—enter into our manufactured iron and steel. (The wonderful alloy steels are described under Alloys.) In steel and some irons a fraction of one per cent of a single ingredient may make or mar the product. The chemist who watches these points is therefore an important man in iron and steel making.

Not composition only, but also structure—metallography—affects the quality of iron and steel. Ordinary cast iron, for instance, is brittle because flakes of carbon in the form of graphite cut through the iron at all angles. Microscopic study has explained many, though not all, of the riddles of the structure of iron and steel.

Formerly wrought iron could not be made by using coal or coke as fuel, for they contain sulphur and the sulphur made the iron brittle. Yet today we are able to make wrought iron by a coke fire, thanks to the "puddling process," invented by Henry Cort in 1784. The secret is that the pig iron is melted and the excess carbon burned out in the hearth of a "reverberatory furnace," *without coming into contact with the fuel*, and hence without absorbing sulphur. The molten iron is stirred by the "puddler" until it forms into spongy balls; these are then worked and reworked to press out the dripping slag; and then, still hot, the puddle bars are run through iron rollers (the "rolling mill" also was Cort's invention), the process being repeated as often as necessary to give the grade of iron desired. It has never been possible to replace highly skilled labor by machinery in the puddling process.

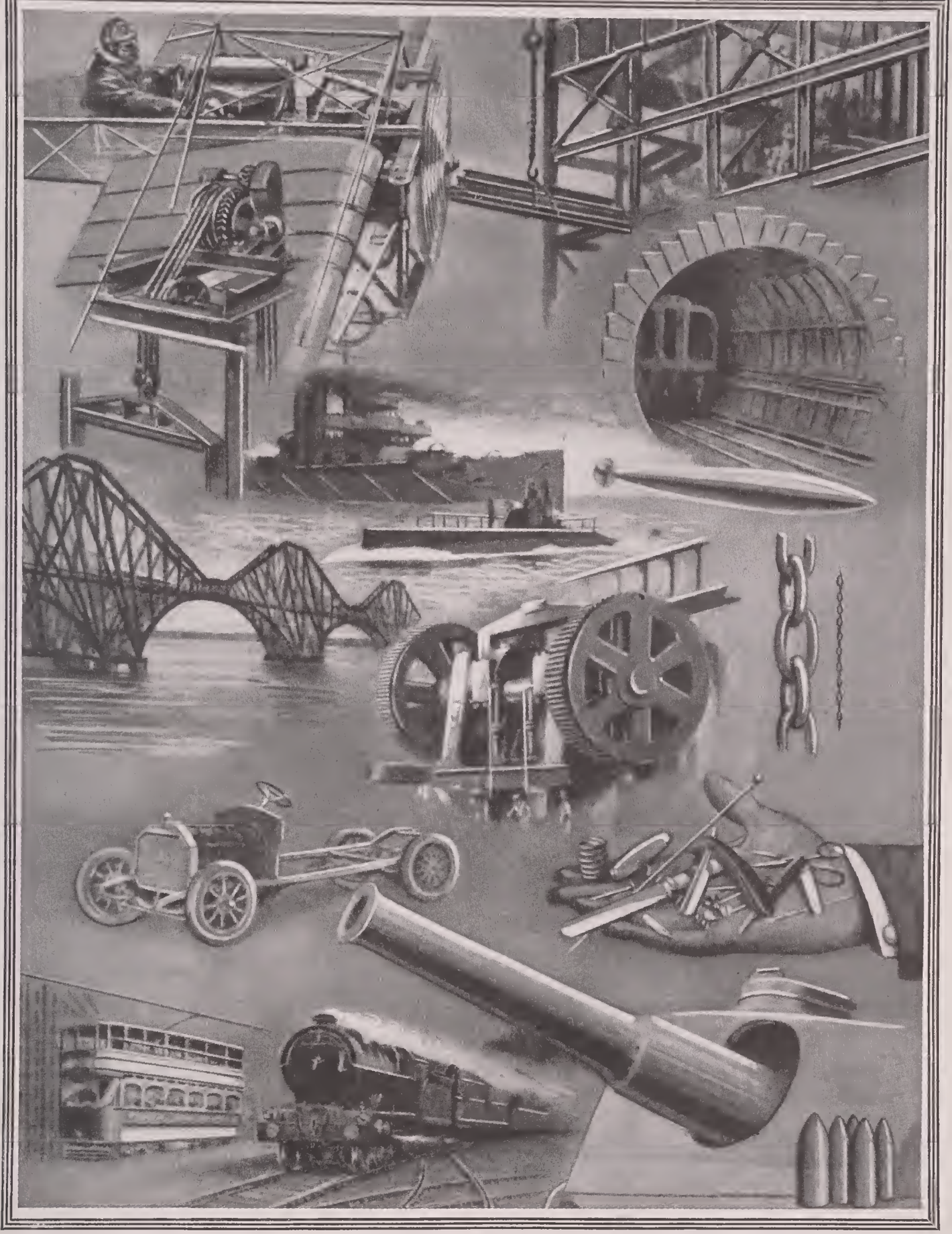
Steel was once made by packing bars of wrought iron on powdered charcoal, sealing them in a clay chest, keeping the whole red hot in a furnace for a week or ten days, then letting it cool for another week or so. This was the "cementation process," and a tremendously expensive process it is; its product was "spring steel" or "shear steel." Then in 1740 a Sheffield watchmaker produced an improved steel by melting cemented steel in a clay crucible. Ever since, the famous Sheffield steel for fine cutlery is made in that way; but American makers of crucible steel carburize and melt in one operation, by melting puddled or charcoal iron in a graphite crucible with charcoal. So long, however, as steel was made only in crucibles, its use in large quantities for steel ships and skyscrapers was impossible.

Kelly, Bessemer, and Modern Steel Making

About 1847 an American named William Kelly noticed that a draft of air striking the molten iron in his Kentucky iron works made the metal seethe and boil. Why did cold air heat instead of chilling the metal? He remembered that the molten iron still contains carbon and other combustible material, and guessed that the oxygen of the air captured and carried away the excess carbon—in other words, that it boiled by burning its own fuel.

This was the beginning of modern steel-making. A few years later an Englishman, Sir Henry Bessemer, observed the same thing, and independently worked out the "fuel-less" process which he patented in Great Britain in 1855. Bessemer has reaped most of the fame from the discovery, but Kelly was granted a patent in the United States, and it is now generally recognized that the two inventors stumbled on the same discovery.

USES OF IRON, THE "FOUNDATION OF CIVILIZATION"



In war and peace, in mighty bridges and delicate tools, iron and steel are the basic materials. Without them we could have no airplane engines, no towering office buildings, no subway trains. Steel alone is both strong enough and abundant enough to be used in the construction of modern ships, automobiles, and machinery. And yet with all its strength and cheapness, steel can be used in the most delicately finished mechanisms—torpedoes, razors, instruments of all kinds. Electric trolley cars and flying railroad trains are two of its gifts to peace; mighty cannon and terrible projectiles among its contributions to war. Truly iron and steel form the very foundation of modern civilization.

contained in the Easy Reference Fact-Index at the end of this work

The original Bessemer process failed to remove any phosphorus that might be present in the iron. This meant that no ores containing more than 0.1 per cent of phosphorus could be used as the basis of the pig iron worked up by this process into steel, for steel containing more than 0.1 per cent of phosphorus is brittle. Thus the Lorraine ores, which contain from 0.3 to 0.8 per cent of phosphorus, were useless for Bessemer steel. But in the very year (1871) which saw the annexation of Alsace-Lorraine by Germany, a new process was invented which makes phosphorus iron ores available for Bessemer steel—indeed, the phosphorus is "turned from a curse to a blessing." It was this process, discovered in England, that soon gave Germany that European supremacy in iron- and steel-making which lasted until the World War.

The Open-Hearth Process

The next great advance in steel-making was the "open-hearth" process—called in Europe the Siemens-Martin process, after its inventors. In this process the molten iron is placed in a basin or open hearth played over by intense heat but shielded from the direct flame, somewhat as in the puddling furnace. The greater heat required is obtained by an ingenious device called the "regenerative furnace." For about half an hour gas and air enter through the "ports" or valves on one side, and burn in the furnace, while the hot gas produced by the combustion escapes through the "ports" on the opposite side; then the valves are reversed and the gas and air admitted through the heated chambers on that side. This periodic reversal produces a continually rising heat until the charge is ready to tap.

With the open-hearth process steel can be made from iron of any composition, and it has the further advantage of permitting physical and chemical tests of the product at any time during the "heat." On the other hand, while a Bessemer converter will make 20 tons of steel in a single "blow" of 15 or 20 minutes, an open-hearth furnace requires about 13 hours to make 70 tons of steel. The Bessemer has long been the cheaper, but, with the growing scarcity of ores suitable for bessemerizing, the open-hearth has become more widely used. In the United States three times as much steel is made by the open-hearth process as by the Bessemer. There are also electrical processes of steel-making which have been in commercial use since the beginning of the 20th century. But the bulk of the world's steel is made by the open-hearth and the Bessemer processes.

The Work of the Rolling Mill

Henry Cort's rolling mill has become even more important in connection with the manufacture of cheap steels than with the wrought iron for which it was invented; it has, indeed, produced a specialized and subdivided industry. Some rolling mills make semi-finished products—"blooms," slabs, billets, and bars—to be worked up elsewhere; others make finished steel products—rods, bands, railway rails, plates, wheels, axles, tires, etc.

Many interesting features of the iron and steel industry must go unmentioned here for lack of space; but one important piece of machinery, the steam-hammer, must be noticed. The early power hammers, invented to do the work formerly done by hand forging, required great labor and constant attention. The novel advantages of James Nasmyth's steam-hammer, invented in 1839, are automatic working and perfect control. The hammer-head or trip is raised by steam; when the steam is cut off, the tip falls; and so exquisitely is the device regulated that a mammoth hammer which could pulverize a granite bowlder with a single blow can also break an eggshell without chipping the egg cup which contains it. The largest steam-hammer ever built, having a trip weighing 125 tons, was set up at the Bethlehem Iron Works in 1891 for use in forging armor plate. It has since been torn down and replaced by a new invention—the hydraulic press. While small steam-hammers are still extensively used, hydraulic presses are usually employed for forging large pieces.

Iron ore is so heavy to transport that one would naturally expect to find iron and steel manufacture flourishing near the mines. But actually many other factors control the industry and more frequently iron manufacture is located near the source of fuel supply. In the United States the Great Lakes provide cheap transportation from the iron regions of the north, so that the big mills can be located not only near the coal fields, but also near the markets where the finished products are sold.

The United States the Leader in the Iron Industry

Great Britain rose to leadership in the iron industry on the crest of the Industrial Revolution in the 18th century. About 1880 British production of iron and steel was overtaken and passed by the United States which also has great supplies of coal and larger supplies of iron ore. At present the United States is the world's greatest iron-manufacturing country, with Pennsylvania, Ohio, Alabama, Illinois, and New York leading in the production. The formation in 1900 of the United States Steel Corporation, with the Carnegie Steel Company as its nucleus—which owned the finest steel-producing plant in the United States and the world, and also had the most complete control of raw materials and transportation—gave that corporation control of about two-thirds of the country's total steel output. It possessed 149 steel works of various kinds, with a collective capacity of nearly 8,000,000 tons of finished steel a year; 78 blast furnaces, capable of an annual production of more than 7,000,000 tons of pig iron; more than 50,000 acres of coking coal lands; more than 1,000 miles of railroad, more than 100 freight vessels on the Great Lakes; an ocean steamship line; besides great ore docks, natural gas and limestone properties, etc. Its capitalization (on paper $1,404,000,000) was said to represent nearly half of all the money in the United States. For such a giant corporation to found a city (Gary, Ind., in 1905–1906) was a mere incident.

IRON MASK, MAN IN THE. In the gloomy Bastille of Paris, in the days of Louis XIV of France, there dwelt a mysterious prisoner known as "The Man in the Iron Mask." Who he was and why he was imprisoned, few knew then, and no one knows today. No one was permitted to look upon his face, for it was always covered with a mask, not of iron, but of black velvet. All we really know of this silent figure is that he had been brought to the Bastille in 1698 from another prison, that he died in 1703, and that his name was recorded as Marchiel—but that was undoubtedly a false name.

Many theories have been advanced as to who the Man in the Iron Mask was. One is that he was Matthioli, the chief minister of the Duke of Mantua. This minister, in return for a large bribe, had promised Louis XIV to betray to him an important frontier fortress belonging to his master. He failed to keep his promise, however, and so Louis had him seized and imprisoned in France for the rest of his life. There are many other theories as to his identity. One of the earliest and most persistent and least credible is that he was a brother of Louis XIV. (*See* Louis, Kings of France.)

Making DESERT *and* SWAMP *Blossom as the* ROSE

How Lands that Have Too Much Water or Too Little are Brought under Cultivation —Irrigation in the Past and the Wonders It is Working in Our Own Day— Vast Areas Still Awaiting Reclamation

IRRIGATION AND RECLAMATION. The early settlers of America had a wonderful choice of rich farm-land in a great undeveloped country. As time passed, the best lands along the Atlantic Coast were taken up and settlers gradually spread through the rich lands of the Mississippi valley, stopping only at the edge of what was erroneously called the Great American desert. The gold rush lured adventurers out across the plains, and others followed to settle on the farmlands of the far West. Soldiers returning from the Civil War sang "Uncle Sam is rich enough to give us all a farm," and this was true at that time.

THE EGYPTIAN'S BUCKET WHEEL



Thousands of years ago the ancient Egyptians were watering their farms by methods very little different from those in use along the Nile today. This, for example, is a crude "bucket and wheel" arrangement for pouring water little by little on the thirsty soil.

At the close of the World War the United States still had a vast area of idle lands—more than 220,000,000 acres, not counting Alaska, but most of this has to be irrigated or drained or otherwise made suitable for agriculture. A large part of the idle land is very rich, but it is not available for immediate cultivation because it is stump land or cut-over land, or it is swamp land too wet to bear the plow, or it is in regions of insufficient rainfall. Much has already been done toward the reclamation of such lands.

When settlers turn to the cut-over lands, which formerly were forest, they must chop the roots and pull the stumps out with horses, or blow them out with dynamite. Stump-pullers of various types are also used. Thus these lands, rich with the humus left by forests, can be put to work.

Inland swamps can be reclaimed by ditching and tiling, and sea-coast areas that are under water at high tide by dams and dikes. In this way very rich farmlands can be created. The thrifty Hollanders have turned the marshes of their low-lying country into the most fertile farm districts of Europe by an extensive system of dikes, canals, and windmills. These reclaimed districts are called "polders." The picturesque windmills, so characteristic of Dutch landscapes, number about 3,000, and are used to pump seepage water out of the low-land in the polders into canals constructed to carry the water to the sea. In the case of Haarlem Lake, three steam engines, capable of pumping 1,000,000 tons of water in 24 hours, were kept at work for four years to pump out the waters of the lake. Cultivation of the lake bed was then begun, but the pumps are still operated to keep pace with the seepage of water. Even this accomplishment is small compared with the work now projected to reclaim the Zuider Zee, which is ten times larger than Lake Haarlem. It is estimated this work will occupy more than 30 years.

It is said that there are from 60 to 80 million acres of swamp lands in the United States. The largest areas are in the lower valley and delta of the Mississippi River, the swamp tide-lands of the Atlantic coast, the Everglades of Florida, and in low-lands bordering on the Great Lakes. In Illinois, Minnesota, and other portions of the country a considerable area has been drained by individual or local effort. Sometimes open ditches lead off the excess water, and drains of tile or cement laid below the top layer of the soil supplement the work.

lands during the dry season. In India large leather sacks or pouches of water, holding as much as 30 gallons, are drawn from wells by bullocks and poured into ditches leading to the ground under cultivation. Governments also have undertaken irrigation on a large scale. There are now some five millions of acres irrigated in Egypt by the British government projects. The Assuan dam, the largest in the world, 1¼ miles long, stores a portion of the Nile in the flood waters, for use during the hot dry season. In India state irrigation works water about 26,000,000 acres.

THE "RIVER SYSTEM" OF AN IRRIGATED ORCHARD



In distributing water by the method used in this Washington orchard, advantage is taken of the general slope of the country. If a stream from those distant mountains, for instance, enters the valley, a canal is cut near its point of entrance, and water is diverted along the upper slopes of the valley. From this canal ditches are taken out to the orchards below, and these ditches in turn feed the smaller ditches you see here sloping back toward the river bed.

Drainage work has been done by corporations, districts, and states, as well as by individual effort. In Louisiana levees have been built to guard against the flooding of the delta lands, and much important work has been done near New Orleans. Drainage has been carried out in Florida in the Everglades region, in Minnesota and North Dakota in the upper valley of Red River, in Indiana in the Kankakee marshes, and in California in the lower Sacramento Valley. Various other swamp areas have been surveyed for government reclamation.

In other waste areas, nature has gone to the other extreme, leaving large tracts of land without sufficient rainfall to grow vegetation of value. Irrigation of arid areas was first undertaken many thousand years ago—in Egypt, Assyria, Babylonia, India, and China. The Egyptians still use buckets at the end of well-sweeps to raise water from the Nile to water adjacent

These great undertakings, however, seem but a drop in the bucket when one considers the waste lands of the Sahara—an area large enough to hold all the States of the Union. The fertility of the oases in the midst of the desert shows what the desert land can do if supplied with water, and challenges man to make this large area blossom as the rose and bring forth fruit at his bidding. Various projects have been discussed for the reclamation of parts of this area, but the desert still waits to test the strength and courage of the first agency undertaking its reclamation on a large scale.

On the American continent, irrigation was practiced by the Pueblo Indians of New Mexico and Arizona before the coming of the white man. The Spaniards taught the inhabitants of Mexico and the southwestern part of the United States to build dams and reservoirs to store water for irrigation. Much has

A TYPICAL IRRIGATION PLANT OF THE WEST



This is the Lahontan Dam of the Truckee-Carson irrigation system in Nevada. In the background you see the dam and the reservoir. The "stairways" on the right and left are spillways for letting the water go on about its business after the reservoir has been filled. The "stilling pool" below the dam is to catch the rush of overflow from the spillways in times of floods, and still the waters so they will not rush down too violently and destroy the river banks. Such great dams as these conserve the waters of the spring floods against the dry summer season, when they are released to supply hundreds of irrigation ditches below the dam. The pressure of the water is used to generate electricity in that power house at the left.

been done in the irrigation of small areas by individual effort, and by associations of farmers uniting to furnish pumps and construct ditches to conduct water to their fields or orchards. Some of the ditches on the old irrigation projects of the earliest settlers are still in use.

By the National Reclamation Act passed by Congress in 1902, the construction of projects too large for individual enterprise has been put under way. This act provides that a large portion of the funds secured by the sale of public lands in 16 states shall be used to construct dams, reservoirs, and ditches for the irrigation of land in these states. The states included are Arizona, California, Colorado, New Mexico, North Dakota, Oklahoma, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, South Dakota, Utah, Washington, and Wyoming. The work is in charge of the Reclamation Service of the Department of the Interior. As a result of this plan, many areas which now are unproductive will supply homes to a large population.

One of the largest of these undertakings is known as the Salt River project, embracing more than 200,000 acres in the neighborhood of Phoenix, the capital of Arizona. Here the great Roosevelt Dam was built to store the waters of the Salt River. Not many miles away, in the extreme southwest corner of that state, is another interesting undertaking, the Yuma project, supplying about 100,000 acres in Arizona and California.

On the Boise project in Idaho is the great Arrowrock Dam, the highest in the world, forming a reservoir capable of storing water to irrigate about 300,000 acres. The North Platte project in Nebraska and Wyoming has an irrigable area of nearly 250,000 acres. The Elephant Butte Dam on the Rio Grande project in New Mexico forms the largest artificial storage basin for irrigation in the world, providing irrigation for 180,000 acres of arid land in New Mexico, Texas, and Mexico. Other important government irrigation plans are the Shoshone project in Wyoming, the Belle Fourche in South Dakota, the Milk River in Montana, the Uncompahgre and Grand Valley in Colorado, the Strawberry Valley in Utah, the Umatilla in Oregon, and the Yakima in Washington.

As a result of these and other great irrigation systems maintained by the Federal government, crops worth $100,000,000 or more are now produced every year from lands that a short time ago yielded practically nothing. Many thousands of people have been established in prosperous and contented homes on these farm-lands and in the towns and cities which have resulted from their development. Not only do irrigated lands prove as favorable for crops as those which Nature most bountifully supplies with water, but they have several advantages of their own. Whereas rainfall sometimes fails when it is most needed and is too profuse at other times, it is possible with an adequate irrigation system to apply water to growing crops at just the time and in just the quantity

needed. Then, too, more rain means less sunshine; in the arid regions there are more sunshiny days, and this makes for better and more rapid development of crops. Still another advantage lies in the fact that the soils of the arid regions have generally not been robbed of their mineral plant foods as have those in the humid, or moist, regions.

ONE OF THE GREATEST OF MAN-MADE LAKES



The water in the big pond made by the Roosevelt Dam would bury the whole State of Delaware a foot deep. Named after President Roosevelt, the dam was formally opened by him March 18, 1911. It is curved upstream so as to offer the resistance of an arch to the tremendous pressure of the water.

On the one-time desert lands of Arizona and California as many as ten crops of alfalfa can be cut in a year. The long staple Egyptian cotton, like that grown in the Nile valley, growing more than six feet tall and worth twice as much as the short staple cotton, flourishes in this hot country; and such fruits as dates, figs, oranges, grapefruit, and grapes are grown where only the cactus grew before. In general, according to United States government estimates, the average yield of agricultural crops on irrigation projects is just about double the average yield on non-irrigated lands in the country at large. In addition to the government projects, irrigation is carried on in various parts of the country by private companies. In California the famous orchards of the southern part of the Sacramento and of the San Joaquin valleys depend largely on irrigation through private enterprises.

In Canada the greatest irrigation project is that of the Canadian Pacific Railway in Alberta, designed to supply water to about 400,000 acres of land.

The Settler and the Irrigated Lands

Settlement on government reclaimed lands is regulated under the Reclamation Act. Land held by one individual is limited to from 10 to 160 acres. The settler is required to work the lands and to pay to the government, in not to exceed ten yearly instalments, his proper proportion of the cost of constructing the irrigation system. After a project is well under way and the community of settlers well established, provision may be made for taking over the ownership and operation of the project by local interests. This releases the government funds for use on the newer projects.

Lands are irrigated in the United States at an average cost of about $50 per acre, and the cost of keeping up the system may average from $1 to $2 an acre. With intelligent farming a profit can be obtained on these lands comparing very favorably with other farm-lands, for there is the great advantage of a steady water supply. There is no danger of crop failure because of drouth.

In irrigating, the water may be applied to the land by flooding, that is, covering the entire surface of the field with water, or it may be distributed over the field and around orchard trees in furrows made for the purpose. Still another method is called sub-irrigation, by means of metal pipes or tile conduits which carry the water underground to the places where it is needed; these pipes may even be perforated to allow the water to flow out along the entire length of the pipes in the field. (*See also* Lands, Public.)

IRVING, WASHINGTON (1783–1859). Essayist, historian, and writer of stories, Irving was the first of the great American writers. Before his time Europe had regarded American authors chiefly as curiosities. But it was quick to recognize the worth of this new writer, so graceful was his style, so fascinating and delicate his humor, and so genial and kindly his manner.



WASHINGTON IRVING
Historian and Story Writer

Irving was born in New York City, then a town of about 25,000 inhabitants, part of whom were Dutch and part English; and it was from this New York that he drew much of the material for his stories and sketches. Never a very strong child, he spent more time with dog and gun, rambling about the country regions which he later described, than he did in school. Sometimes, too, he wandered into the Dutch part of the city and listened to the quaint stories told by the

THE SMOKERS' REBELLION IN FULL BLAST



One of the innumerable funny stories in 'Knickerbocker's History of New York' tells how Wilhelmus Kieft, one of the Dutch governors of New York, thinking people talked politics too much and that smoking was the cause of it, issued an edict prohibiting the practice. Whereupon the smokers, with those long pipes and plenty of tobacco, gathered before the Governor's house and—well, you can see for yourself! The rebels won. They "smoked him out"! The picture is from a painting by the distinguished American artist, George H. Boughton.

Dutch descendants. At home he read a great deal in his father's large library. He was always cheerful, kindly, and sweet-natured, though a great part of his life was a struggle against ill health, grief, and uncongenial work; for the day had not yet come when an American author could hope to support himself by his writing alone.

Irving began the study of law, but his already delicate health was still further impaired by grief over the death of his fiancee. His family, therefore, sent him abroad, where he traveled in England, Holland, France, and Italy. When he returned, he wrote a humorous miscellany entitled 'Salmagundi', and a little later appeared his burlesque 'History of New York' from the Beginning of the World to the End of the Dutch Dynasty, supposed to have been written by "Diedrich Knickerbocker." Irving soon went abroad again on business for his brothers, and this time he met many famous writers in England and gained new inspiration. He now set about writing in earnest. The first book he put out after this was 'The Sketch Book', for which through the influence of Sir Walter Scott an English publisher paid him $2,000. Irving remained abroad for many years traveling, writing, and in diplomatic service of his country. While he was minister to Spain (1842) he became interested in Spanish history, and his studies there furnished his lively imagination with plenty of material for 'The Alhambra' and his life of Columbus. The last thirteen years of his life he spent at his home near Tarrytown on the Hudson, a region his pen has made famous. He is buried in Sleepy Hollow Cemetery, near the road where Ichabod Crane fled from the headless horseman.

'The Sketch Book' is the best and most widely known of Irving's works. It contains the stories and sketches everybody reads—'Rip van Winkle' and 'The Legend of Sleepy Hollow'—in which Irving used the legends the descendants of the old Dutch settlers had told him, the mysterious tale of the return of Hendrick Hudson and his men, and the ghost story concerning the headless horseman. One feels the very atmosphere of the sleepy prosperous country, and its quiet prosperous folk. Other charming sketches are the essays on Westminster Abbey and on the Shakespeare country. 'The Alhambra', named for the old Moorish palace in Spain, contains beautiful descriptions and tales of captive princesses and talking doves, of magicians and knights and peasants.

Irving's chief works are: *Sketches, Essays, and Tales*—'Knickerbocker's History of New York' (1809); 'Sketch Book' (1819); 'Bracebridge Hall' (1822); 'Tales of a Traveller' (1824); 'The Alhambra' (1832); 'Wolfert's Roost' (1855). *Histories and Biographies*—'The Life and Voyages of Columbus' (1828); 'The Chronicle of the Conquest of Granada' (1829); 'The Life of Mahomet' (1849); 'The Life of Goldsmith' (1849); 'The Life of Washington' (1855–59).

contained in the Easy Reference Fact-Index at the end of this work

ISABELLA OF CASTILE (1451–1504). It was the happy fortune of Queen Isabella of Castile and Leon to give to Europe a new nation and to the world a new continent. The first service came through her marriage in 1469, while queen of Castile and Leon, to King Ferdinand of the neighboring and rival Spanish kingdom of Aragon, thus uniting the two chief kingdoms in the Spanish peninsula. Her second claim to fame came through her support of Columbus.

Isabella was a woman of remarkable energy and talent, beautiful and possessed of winning grace, although at times proud and ambitious. She was always present at state meetings, and her name was placed with that of Ferdinand at the end of all official documents. Her part in the founding of a national Spanish inquisition under royal control, with its persecution of the Moors and Jews, shows the intolerance in religious matters which she shared with her husband and her times.

History relates that Columbus, when he applied at the court of Spain for help in his projected voyage of discovery, failed to receive the sanction or aid of Ferdinand and the learned council. Columbus, discouraged, was about to leave for France, when he succeeded in interesting Isabella in his plan. The king remained indifferent and pleaded want of funds. The queen, so the story runs, in her earnestness exclaimed: "I pledge my jewels to raise the money." Columbus succeeded at last, and to Isabella belongs the honor; for even though the story of the jewels has no basis but legend, it is true that Isabella's interest and support made possible Columbus' voyage.

ISINGLASS. The dried swimming bladders of several varieties of fish. It contains from 86 to 93 per cent gelatin and sometimes more. The Russian variety, which is supposed to be the best, is made principally from the sturgeon. Isinglass is used for the same purposes as gelatin, in soups and jellies, for clarifying fermented liquors, and in the manufacture of glue, court plaster, cement, etc. (*See* Gelatin.)

ISIS (*ī'sĭs*). The "queen of the gods" in Egyptian mythology was Isis, the sister and wife of Osiris. She represented the moon as Osiris did the sun, and was believed to have taught agriculture to the Egyptians. The old legends tell of her lament for her slain husband and it was said that her tears caused the overflow of the Nile. She is frequently pictured with her infant son Horus. The cow was sacred to her and she is often represented with the horns of this animal. The worship of Isis was introduced into Greece about the third century B.C and later became very popular in Rome. (*See* Osiris.)

The Sonorous ITALIAN TONGUE, *Beloved of Poets*

ITALIAN LITERATURE. The Italian language is a daughter in the direct royal line from ancient Latin, and resembles her the most of all the Latin descendants. The sonority and rhythm which French has lost, the delightful clearness which has become a bit blurred in Spanish, all remain in melodious Italian, the ideal language of poetry, in which it has always excelled.



DANTE

Yet modern Italian, being to a large extent a forced bloom, suffers in many respects from its artificial growth. For in the Middle Ages, while literary Latin of a sort continued to be used as the learned and cultured language, the mass of the people of Italy, mingling the old Low Latin of popular speech with imported foreign elements, contrived to swing it into a score of different dialects. Then came the great Dante, who selected the dialect of Tuscany for his literary work, and revealed its strength and beauty in his epic masterpiece, 'The Divine Comedy'. Petrarch and Boccaccio followed him, and wrote immortal lines in Tuscan—epic verse especially in the one case and prose stories in the other. Thus this dialect became the fixed literary language of Italy, and is today so recognized.

But the many other dialects still exist, and their words tend to creep in, not always elegant or well conceived; and it is here that the struggle between the classic but often cramped Tuscan and the cruder, but more vigorous popular dialects places the Italian writer at a loss. This artificiality and limitation of Italian, in spite of its rich sweetness, is therefore to be reckoned with in explaining why Italian writers of all times, and especially at present, are not as numerous as in other countries. But it has with equal truth been said that "Italian writers must be weighed, not counted." If they have been few, they have also been very great.

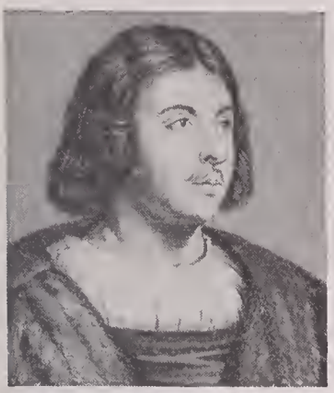


PETRARCH

Latin long remained in Italy more nearly a living tongue than elsewhere, and hence a written literature in the vernacular or people's language was slow in arising. Indeed, it was not until the beginning of the 14th century—whose close saw Dante's genius—that any truly Italian literature appeared.

Late as it was in starting, this literature attained its greatest glory almost immediately, far outshining all other literatures of the period. Dante (1265–1321) wrote his 'Divine Comedy' a century before Chaucer and three centuries before Shakespeare.

Petrarch (1304–1374) followed with his immortal sonnets to "golden haired" Laura, and Boccaccio (1313–1375) with his famous collection of prose stories entitled 'Decameron'.



BOCCACCIO

But with the great revival of interest in the ancient Greek and Latin literatures, which was also a feature of the Renaissance, the new Italian literature declined. The brightest spirits sought their inspiration in antiquity and the newly formed Italian tongue suffered through an affected and elaborate striving for Latin elegance.

It was not until the 16th century that Italian writers returned to a natural and spontaneous style. This century has been called the "golden age of Italian literature," not because it produced men of supreme greatness, but because of the large number of pleasing and competent writers who appeared. The best known of these are Ludovico Ariosto with his masterpiece 'Orlando Furioso', and Torquato Tasso whose 'Jerusalem Delivered' is a reaction against the worldliness of religion in his time.

During the 17th and the first half of the 18th century Italy suffered from a grandiose literary style and an emptiness of literary ideas. It was not until the advent of Count Vittorio Alfieri with his tragic plays, in the second half of the 18th century, that Italy was aroused to a sense of the emptiness of its recent literature. Alfieri started also a wave of Italian patriotism—the conscious stirrings of an Italian desire to be rid of the petty tyrannies and foreign control which had torn the land for centuries.



TASSO

Out of this new patriotism grew many romantic dreams, touched with intense political reactions, which give the Italian literature of the 19th century —the century of Italian unity and freedom—a new vigor. Starting with Vincenzo Monti, who sings in heroic notes the conflicting sentiments of the early period, the tendency soon leans toward the romantic school of Alessandro Manzoni, the poet of the 'Fifth of May' and the novelist of 'The Betrothed'. With the awakening of Italian national consciousness, we see a reaction against foreign topics and a desire to depict the life and thoughts of the Italian people. In poetry Giosuè Carducci expresses beautifully this enthusiasm for Italy and things Italian; in prose Matilda Serao and Antonio Fogazzaro show the same tendency.



D'ANNUNZIO

Overshadowing all other Italian writers in the first quarter of the 20th century was the figure of D'Annunzio. An excellent poet and a powerful novelist, his military exploits as an aviator during the World War of 1914–18 added immensely to his popularity. While his ill-advised seizure of Fiume in defiance of international agreements made him appear vainglorious, nothing could detract from his high literary fame.

GREAT FIGURES IN ITALIAN LITERATURE

Dante Alighieri (1265–1321), epic poet—'Divina Commedia' (The Divine Comedy); 'Vita Nuova' (The New Life).

Francesco Petrarch (1304–1374), poet—Sonnets.

Giovanni Boccaccio (1313–1375), poet and writer of prose tales—'Decameron'.

Ludovico Ariosto (1474–1533), epic poet—'Orlando Furioso'.

Torquato Tasso (1544–1595), epic poet—'Aminta'; 'Gerusalemme Liberata' (Jerusalem Delivered).

Giovanni Battista Marini (1569–1625), poet—'L'Adone'.

Carlo Goldoni (1707–1793), comic dramatist—'La Bottega di Caffe' (The Coffee House).

Giuseppe Parini (1729–1799), poet—'Il Giorno'.

Carlo Gozzi (1722–1806), dramatist—'Turandot'.

Vittorio Alfieri (1749–1803), dramatist—'Saul'; 'Oreste'; 'Virginia'; 'Timoleone'.

Vincenzo Monti (1754–1828), poet and dramatist— 'Aristodemo'; 'Bassevilliana'.

Alessandro Manzoni (1785–1873), poet and novelist—'Il Cinque maggio' (The Fifth of May); 'I Promessi sposi' (The Betrothed).

Giacomo Leopardi (1798–1837), poet—'La Ginestra'.

Giosuè Carducci (1836-1907), poet—'Hymn to Satan';'Odi Barbare' (Barbaric Odes).

Giuseppe Giacosa (1747–1906), dramatist—'Come le Foglie' (Like Falling Leaves); 'Tristi Amori' (Hapless Love).

Antonio Fogazzaro (1842–1911), novelist and poet—'Miranda'; 'Leila'; 'Daniele Cortis'.

Matilda Serao (1856–), novelist—'Il Paese di Cuccagna' (The Land of Cockayne).

Gabriele D'Annunzio (1864–), poet and novelist—'Il Trionfo della Morte' (The Triumph of Death); 'Le Vergini della Roccio' (The Virgins of the Rocks).

contained in the Easy Reference Fact-Index at the end of this work

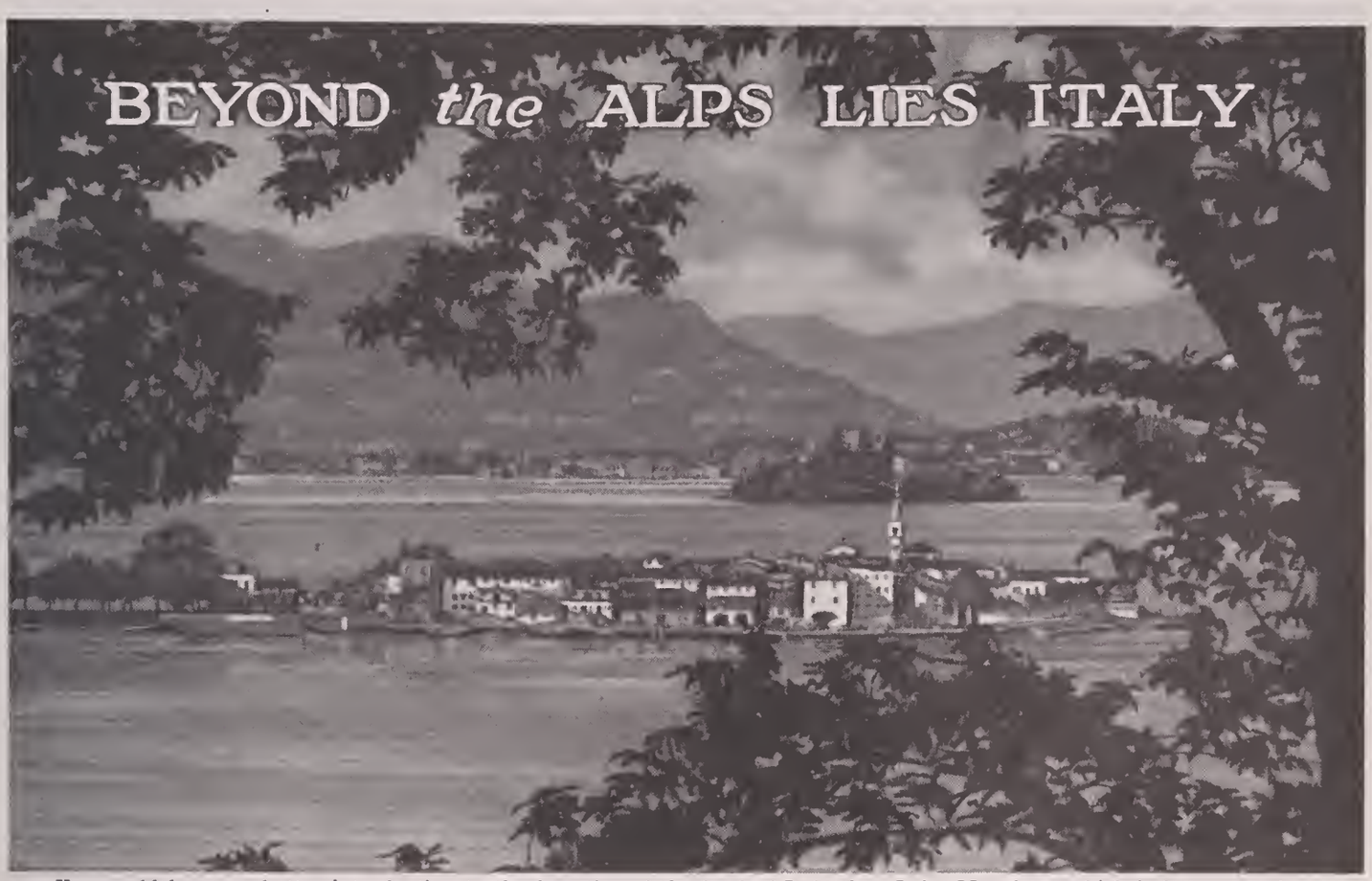
A FAMOUS CHURCH AND ITS FAMOUS TOWER



Among the most splendid works of architecture in Italy is the cathedral or Duomo in Florence and the "campanile" or bell-tower beside it. The cathedral, begun in 1298, was not completed for more than a century, when the genius of Brunelleschi devised a way of constructing its great dome. The front or façade, however, is modern, having been completed in 1888. The campanile was designed by the master artist, Giotto, who began the work in 1332. These two buildings are reminders of the "golden age" of Italy, when Florence was the intellectual and artistic center of Europe.

For any subject not found in its alphabetical place see information

BEYOND *the* ALPS LIES ITALY



You could have no better introduction to the beauties of the land of Italy than Lake Maggiore, which is here spread out before us with the Alps in the background. It is one of the most famous of the "lake jewels" of northern Italy. The north, west, and southwest shores rise into lofty mountains with snow-capped peaks, while the east bank gradually slopes toward the level plains of Lombardy on the southeast.

ITALY. The peninsula of Italy dips down into the blue waters of the Mediterranean like a tall high-heeled boot, walking off towards Spain and kicking along the islands of Sardinia and Sicily in its path! The very top of the boot is rimmed with the snowy peaks of the Alps, and handsomely bejeweled with bright lakes—Maggiore, Lugano, Como, Iseo, and Garda. Here also lies the flat fertile valley of the Po, richest of farm land. The leg of our boot is ridged by the Apennine Mountains (*see* Apennine Mountains); and scattered along its length are the plains of Tuscany, the Campagna di Roma, Apulia, and the fertile Campania near Naples. On the Adriatic side lies the misplaced "spur" of Mt. Gargano, partially inclosing the Gulf of Manfredonia; while in the hollow of the foot lies the deeply indented Gulf of Taranto. Many short rapid streams dart down the mountain slopes; but the chief rivers besides the Po are the Adige, Arno, Volturno, and the tawny-sanded Tiber, the historic river of Rome. Our "boot" is 700 miles long and 350 miles wide. Its area is about twice that of Illinois, while in population it ranks fifth among the states of Europe—next after France. In climate it ranges from the ice-bound Alps and chilly winters of the north, through a sunny mellow phase, to a nearly tropical warmth in the southernmost section where orange and lemon trees grow abundantly, and the hills are "o'er-smoked by the faint gray olive trees." So blue are the skies and so bright and warm the air of most of the peninsula, so pleasant the life and so storied the soil, that poets have sung of Italy for centuries, and travelers return and return again.

In fact, Italy stands today somewhat in the position of a fair dramatic masquerader, who has played such a romantic part that people dislike to lift the mask and look upon the well-known workaday features of modern humanity. They want to think of Italy as the home of ancient Roman ghosts, of gorgeous medieval princelings, of black politics in brilliant days, of artists and singers and dreamers. They are so bemused by her glowing art and radiant

Extent.—Greatest length of peninsula, about 700 miles; average breadth, 100 miles. Area (including islands of Sicily and Sardinia, etc., and gains in the World War), 123,000 square miles. Population, about 37,000,000. Colonies, dependencies and mandates: Eritrea, Italian Somaliland, and Tripoli and Cyrenaica in Africa; Island of Rhodes; Adalia in Asia Minor; Avlona in Albania. (Total, about 590,000 square miles.)

Physical Features.—Mountains: Alps and Apennines. Volcanoes: Mt. Vesuvius (near Naples) and Mt. Etna (in Sicily). Rivers: Po, Adige, Arno, Volturno, Tiber. Lakes: Maggiore, Lugano, Como, Iseo, Garda.

Chief Cities.—Naples (700,000), Milan (665,000), Rome (capital, 591,000), Turin (452,000), Palermo (346,000), Genoa (300,000), Florence (243,000), Trieste (230,000), Venice (169,000), Catania, (220,000), Bologna (190,000), Messina (150,000), Bari (110,000).

Products.—Agricultural: olives, grapes, lemons, oranges, and other fruits; maize, wheat, rice, and other grains; potatoes, sugar beets, flax, almonds, pistachio nuts, cotton. Mining: chiefly sulphur; iron in island of Elba; marble in Carrara; some zinc, quicksilver, copper, salt, petroleum. Manufactures: wines, silks, olive oil, jewelry, machinery, automobiles, majolica, glass, cameos, enameled ware, paper, leather, chemicals, straw hats, macaroni, cheese, liquors, sugar, soap. Fishing: tunny, anchovies, sardines, etc.



It is easy to see from this map why Italy is often referred to as a "boot." It looks exactly like a booted leg, hanging from Switzerland as the body and about to kick Sicily into Africa. The "bones" of the leg are the rugged Apennines, which you can trace from France clear down the peninsula to Reggio. North of the Apennines is the valley of the Po, known as Lombardy, from the Germanic Lombards who settled there in 568. The valley of the Arno forms the district known as Tuscany, while the plain surrounding Rome is the Campagna. The district about Turin is known as Piedmont. The northern boundary shown in black is that which was fixed as a result of the World War, the white dots showing those portions of it which were formerly held by the Austro-Hungarian dual monarchy. The islands of Sardinia and Sicily also belong to Italy.

sunshine that they have almost ignored the strivings of her people today, in many ways finer than the loud greedy squabbles of Romans and Carthaginians, of Guelfs and Ghibellines, of Spaniards and French, in the long ago. Caesar's voice speaks clearer than Garibaldi's to most people still.

Perhaps they feel thus because Italy has been a free nation—has had a vital present and a hopeful future—for so short a time. She emerged from division and foreign misrule only as late as 1870. The Lombard invasions and the rise of the Papal States broke the unity of Italy in the early Middle Ages.

For any subject not found in its alphabetical place see information

THE LIBERATOR OF ITALY AT A CONFERENCE WITH THE HERO KING



Garibaldi, though theoretically a republican, was greatly attached to the bluff soldier-king, Victor Emmanuel of Sardinia, and the two coöperated in driving the Austrians from Italy. When the first volunteer troops were raised in 1859, the King appointed Garibaldi commander, and when Garibaldi decided on the conquest of Sicily, Victor Emmanuel helped him. After the successful conclusion of this enterprise Garibaldi handed over his conquests to King Victor, who was soon after proclaimed King of United Italy.

Since then emperors and popes, kings of Naples and dukes of Milan, had dreamed in turn of restoring the "kingdom of Italy"; but its five chief powers—Venice and Florence, Milan and Naples, and the Pope—rarely united of their own accord. France and Spain made Italy a battleground of bloody rivalry; and the substitution of Austria, following the French Revolution, as the chief controlling power—with Venetia and Lombardy directly in her rule—made the outlook yet more gloomy. As Metternich, the Austrian statesman, truly said, Italy had become "only a *geographical* expression."

But brave blood was many times shed in the hope of remaking Italy. A secret society called the *Carbonari* ("charcoal burners") flourished in the early part of the 19th century, with the overthrow of native and foreign despotism as its object. Not merely rude peasants but fiery patriots of the best families were among its members, blackening their faces and otherwise disguising themselves to carry on their political conspiracies.

Revolts in 1820 and 1830, however, were crushed by Austrian troops. Then the idealistic republican, Giuseppe Mazzini (*see* Mazzini), organized his revolutionary society called "Young Italy." And while King Charles Albert of Sardinia-Piedmont in the stirring days of 1848 battled unsuccessfully against the Austrians at Custozza and Novara, Mazzini drove out the Pope and set up a brave but ill-starred republic in Rome. French soldiers of Napoleon III, however, soon conquered it, and Italy was, as before, a dark realm of Austrian and Bourbon tyranny in the north and south, with the temporal power of the Papacy between. Only Sardinia-Piedmont under its new hero king Victor Emmanuel II kept its constitution and the Italian tri-colored flag.

But this, as it proved, was the seed from which Italian unity and liberty should grow. Under the able leadership of that shrewd diplomat Count Camillo Benso di Cavour (*see* Cavour), the great minister of Victor Emmanuel, Sardinia-Piedmont grew strong in resources and in alliances. Cavour had learned that, genuine as was Italian patriotic fervor, Italy would never be unified without help from abroad. Therefore he cleverly won the alliance of Napoleon III of France, and in the spring of 1859 Austrian stupidity and pride were skilfully goaded into declaring war. France and Sardinia-Piedmont defeated the Austrians at Magenta and Solferino, and so won Lombardy for United Italy. But Napoleon, startled at the dust he had raised, hurriedly arranged matters with the Austrians, allowing them to retain Venetia. Cavour and Victor Emmanuel were clever enough to veil their disappointment and wait. At once the small states which checkered north-central Italy—Tuscany, Modena, Parma, and the Romagna—cast out their absolute princes and joined the victor of the north. Napoleon III consented to the arrangement, in return for the cession by Piedmont of Savoy and Nice to France.

The second stride toward a United Italy came next year, when the famous soldier of fortune, Giuseppe Garibaldi, gathered about him his thousand volunteers, stormed the island of Sicily, and then the main-

land part of the kingdom of Naples. The people everywhere hailed him as a liberator, and drove out the hated Bourbon king. (*See* Garibaldi.) There remained only the Papal States and Venetia to be joined to the new-made Italian nation, when (in February 1861) Victor Emmanuel of Sardinia was proclaimed King of Italy. Venetia was gained in 1866, after Austria was defeated by Prussia, in alliance with Italy.

A SUNNY SON OF SUNNY ITALY



The disposition of the average Italian in his native home is as sunny as the land he lives in. This is an ox-cart driver who hauls the famous Carrara marble. The white "Roman" oxen are a celebrated breed, noted for their great strength.

Rome alone was now outside the Italian kingdom, and the lack of that central and dividing strip of territory was a very real handicap.

French troops still guarded the Pope's sovereignty, and Victor Emmanuel was too intelligent a pupil of Cavour (who had died in 1861) to attack the French and thus perhaps undo all that had been accomplished. Once more he let "the stars in their courses work for Italy." In 1870 the Franco-Prussian War forced France to withdraw her soldiers from Rome. The Roman people welcomed the army which Victor Emmanuel marched into Italy's ancient capital. Pope Pius IX, excommunicating the invaders, withdrew into the Vatican, which has since been the Pope's official residence. As the healing of time goes on, much that was bitter and unhappy is disappearing from a situation which has been as awkward and difficult as any government ever had to face.

Other giant tasks lay before the Italian government of 1870. The whole machinery of government for the new kingdom had been created in a day and offhand; and like all new machinery it worked stiffly. It was, and still is, a constitutional monarchy, with a parliament composed of a senate and a chamber of deputies. The right to vote for the 508 deputies was at first confined to men who could read and write and who paid a small tax; but in 1912 complete manhood suffrage was adopted, and in 1920 woman suffrage was added. The king appoints some 300 senators for life; and in addition the princes of the royal family are members.

Before this government, so new and untried in 1870, the future loomed up with as great a challenge and as many dangers as confronted George Washington and the Revolutionary fathers when the 13 colonies won their freedom; yet how different was the situation. America was a sweet new soil, her people in comparison one at heart and one in language. Italy was an old worn land, her very earth stained with the tyrannies of centuries, her people divided and altered by foreign rule, until their very speech had split into some 15 dialects and their minds were set in local molds and prejudices. American mountains were packed thick with precious minerals, and extensive forests waved over the vast unplowed acres. In Italy the hills had for years been ransacked of their scanty minerals, the wood long since had recklessly been cut and the exploited soil was made stale by bad farming. Moreover, the mass of the Italians were uneducated and without traditions of education. They were huddled together in cities, big and little, and suffered from poor sanitation in city and country. Few of them had enough to eat; and in the swampy lands of the Maremma, the Pontine marshes, and elsewhere, hundreds died yearly of malaria and pellagra, a terrible disease caused by improper diet. Through centuries of misrule they had learned to distrust all governments, and thus powerful secret societies, defiant of the law, came to flourish darkly in Italian cities, contrary to every open and wholesome way of life.

Here were some of the graver ills which the new-made Italian government must seek to remedy if the nation was to live. As Cavour had pointed out Italy must look to her industry, to the means of life itself, before the quality of that life could be greatly improved. In the island of Elba alone does Italy possess iron mines. Her lack of coal to turn her factory wheels was her most serious shortage. Therefore Italian water-power, thundering down in numerous mountain streams, has been and continues to be developed, so that in time the riches of the country need not be spent out again for coal and more coal. The rich valley of the Po, the "kitchen garden" of Italy, has been netted with irrigating canals; and

the patient laborious farmers have been taught to combine more science with their patience and labor. They have learned to fertilize and replenish their fields, to rotate crops and improve the breeds of their animals. Not an acre of productive soil today but is as carefully kept and tended as a drawing-room. And trees are being planted, and the lost forests are slowly returning.

The government also plunged energetically into the matter of public education, establishing common schools and trade schools, not nearly so many as were needed, but as many as were possible. The shocking percentage of illiteracy is being reduced more and more, and the skill of Italian workmen has so greatly improved that now nearly all the foreign foremen and experts have been supplanted in Italian industry by first-rate native workmen. Public health is vastly better, because the malarial marshes have been drained, sanitary laws drawn and enforced, pure water supplies piped to the large cities, and many of the slums and insanitary quarters torn away and rebuilt. The Tuscan dialect has become the national language, because it is the purest and most harmonious of the several dialects. It is taught in the public schools and also in the army, where every young man renders two years' service. This compulsory service, whereby the youth of Italy learn one tongue, and where the blond young citizen of Lombardy rubs elbows with his swarthy brother of Calabria, has been the "melting pot" of Italy, serving to wipe out the offish and awkward little provincial antagonisms more than any other one force. And of course, with her 4,160 miles of seacoast, Italy has "gone down to the sea in ships," and now possesses a powerful navy and a large merchant marine.

There are, of course, dark spots in the picture. The attempt to keep abreast with the other powers in military expansion and colonial adventures in the Red Sea region of Africa have proved very costly. The Italian system of taxation remained seriously in need of reform, bearing as it did more heavily on the poor than on the well-to-do. The system of

INDUSTRIES OF A SMILING LAND







Did you know that spaghetti was hung out to dry, as you see in that upper picture, taken in Naples? There it is hanging from the framework like so many shoe-strings. The middle picture shows a corner of a lemon grove in Sicily. At the bottom we have a view of the famous marble quarries of Carrara, from which came the material for many of Italy's buildings and statues.

land tenure, by which the man who worked the land was seldom the owner of it, had all the drawbacks of any tenant system. The owner all too often gouged the peasant for all the rent he could get, and the peasant made up his shortage by robbing the soil. These two faults of taxation and tenantry in Italy, combined with over-population, led large numbers of Italians to emigrate, and brought more than a million and a half of them to the shores of the United States. The government lottery must also be listed as a serious evil, in spite of protests by the Italian government that gambling is a genuine impulse of Latin nature, and would exist even though the government did not profit by it. More sinister still was the silent governmental tolerance and even protection of such dark criminal organizations as the Mafia of Sicily and the Camorra of Naples, bringing crime and "graft" into high places, after the manner of the American "Tammany." But it is more just to consider what has been done, rather than what has been left undone, by the Italian government in raising a sick, starved, wronged people up to be a power in the world, and that in the space of some 50 years. Italy is today a thrilling example of the spirit which dares "to take arms against a sea of troubles, and by opposing, end them."

THE ARCH OF AUGUSTUS AT RIMINI



When Rimini was a part of the Roman Empire, it was known as Ariminum. It was one of the 18 richest cities in Italy and the fine Roman road, the Via Flaminia, which led to it from Rome, was the highway of busy traffic; so when Augustus, after a period of neglect by his predecessors, restored the road, the grateful citizens of Ariminum built that arch over it where it entered the city, and called it the Arch of Augustus.

In 1900 King Humbert, son of the first king, Victor Emmanuel II, was assassinated by an anarchist. His son, Victor Emmanuel III, succeeded him on the Italian throne. In 1908 a terrible earthquake destroyed the city of Messina, and in 1915 the disaster was repeated in central Italy. Italy seized Tripoli from Turkey in a war ending in 1912, and made a number of territorial gains in the World War of 1914–18—the "unredeemed Italy" of the Trentino in the north, the peninsula of Istria at the head of the Adriatic, and some territories of uncertain extent in Asia Minor. In spite of the Italian reverse at Caporetto (*see* World War), the brilliance and perseverance of the Italian troops struggling with the Austrians in the Alpine passes, and their heroic stand when rallied on the Piave River, proved the vigor which 50 years of freedom had put into Italian blood. Since the war Italy has been vexed with labor troubles. Italian industry is obliged to import most of its raw materials, and employers have sought to overcome this handicap by paying lower wages than prevail in other countries.

Most of the labor unrest occurs in north Italy where the manufacturing industry of the country is centered. In fact, we may think of Italy as divided into three sections—north, south, and central—so different are the interests and traits of these parts. By northern Italy is meant Lombardy, Piedmont, Venetia, Emilia, Liguria, and Tuscany. Here, more than elsewhere, is the hum of manufacturing, the bustle of restless modern cities, the touch-and-go of the busy ports of Genoa and Venice. Here fine silks are woven, white marble is quarried, automobiles and machinery made, wines pressed out, Leghorn hats woven, beautiful jewelry designed and fashioned, mirrors and majolica and glassware of world fame manufactured. Here fine farms produce grain, poultry, excellent cheese, potatoes, flax, and (in the wet lands) rice. Here the people are better educated, more substantial, progressive, and composed; and many have fair hair and blue eyes, and contrast in their cool sagacious realism with their more sparkling and warmer-blooded brothers of central Italy. The latter includes Umbria, the "Marches," Abruzzi, and

THE BEAUTIFUL LAKE IN THE SNOW-CAPPED MOUNTAINS



Perhaps the most beautiful among the famous lakes of northern Italy is Lake Como. It winds its long and narrow way among the rugged mountains, reflecting the bluest of blue skies. The great Roman poet Vergil made it the subject of his song, and poets have been singing about it and painters painting it ever since. The shores are bordered by splendid villas, such as those you see in this picture. It doesn't always look so placid, however, for, like other mountain lakes, it is subject to sudden and violent storms.

Molise, and the Romagna. In general one may say that most of the artists, musicians, and clever professional men of Italy come from the central section. The district is chiefly agricultural, having but two large cities, Rome and Naples.

In the south—in Campania, Apulia, Basilicata, Calabria, Sicily, and Sardinia—is the chief stronghold of superstition, ignorance, poverty, and backwardness. The peasants plod along over the brown hills behind their great oxen, working painstakingly for 16 and 17 hours a day. There are few cities in the south, and the people seem strangely content in their hard life, taking their troubles to their miraculous saints and madonnas, and grinding dreamily along in their old ways.

All Italians, whether of the north, center, or south, are usually possessed of a Latin charm and natural courtesy, a combined simplicity and cynicism, a quick temper and a kind heart. They have a keener taste for luxury and finery than Americans, perhaps; yet few Americans could be so frugal, so patient at long dull labor, so gentle and unembittered in hardship. The American would fail through pettish contempt, where the Italian sings blithe and dubious "stornelli" all the long hard day—as he trims his vines or tends his small neat fields, stopping only for the monotonous meals of corn mush, cheese, bread, and wine. Now and then he has a lively holiday, at carnival time or at a country feast, but he needs no such constant beguilements as Americans demand. Yet, on the other hand, he will often defeat his own ends through some old and angry prejudice; and fall into dismal bickerings, and even into spectacular crimes, over matters which the cooler American spirit would adjust with the minimum of public display. It is hard to understand where the Italians got their reputation for being

AN ITALIAN FISHERMAN



A large proportion of the people along the Italian seashore are engaged in fishing. The fishermen and their boats form one of the most picturesque sights for the visitor.

lazy, since it is their strong bodies which have carried on the campaigning of the industrial world everywhere—building railroads, mining coal, wrestling with the hardest labor. They are not lazy, neither are they pale or still or cool in any respect, whether in their faults or in their virtues.

A TENEMENT QUARTER IN PICTURESQUE NAPLES



The southern Italians are a happy and carefree people, and among the gayest are the people of Naples. In the poorer quarters, the streets are the playgrounds and often the workshops of the inhabitants. Here you see how, by friendly agreement, clothes-lines are stretched from house to house and the family wash is set fluttering in the breeze.

Closely connected with the Italian blood and destiny are the people of the curious little republic of San Marino, which claims to be the oldest state in Europe. It is an independent nation of 38 square miles near the Adriatic coast, and with a population of some 11,000 souls. It is completely surrounded by Italian soil and is bound by a treaty of friendship to Italy. Legendary history states that it was formed in the 4th century by St. Marinus of Dalmatia, and certainly its independence was formally recognized in 1631 by Pope Urban VIII. The frowning castle and two great towers of the town of San Marino, capital of the republic, look down on scenes little changed since medieval days. Winding streets, so narrow that vehicles are rarely used, slant up and down, running between rows of small stone dwellings, many of which seem in danger of tumbling from their perch on the uneven ledges and steep slopes:

The customs of this interesting town, too, are full of colorful survivals of the Middle Ages. On the evenings of festival and election days beacon fires are lighted on the hilltops, summoning the countryside to the merry-making. The rest of the year life flows placidly on, undisturbed by the current of modern life; for San Marino has little to do with the outside world except as a market for her stone, wool, and wine.

Dark whites of the Mediterranean race inhabited Italy in the Stone Age, and a substratum of this population exists to this day. The Latins, who founded Rome, were one of a group of fairer "Aryan" peoples, who came into the peninsula before recorded history begins. Etruscans, Greeks, and Carthaginians — Goths, Vandals, Lombards, Saracens, and Normans—all flowed over the land leaving traces of their blood in the Italians of today.

Following the downfall of the Roman Empire in the West (*see* Roman History) and the fleeting rule of the barbarian kings, Odoacer the Herulian and Theodoric the Ostrogoth, came an equally fleeting reunion of Italy to the Eastern Empire (*see* Justinian I). The Frankish conquests of the Lombards by Charlemagne (*see* Charlemagne) and his coronation at Rome in 800 checked for a time Italian disintegration, to be resumed with the rise of feudalism. The refounding of the medieval empire by the Saxon Otho I (in 962), and his assumption of the "Iron Crown" of Italy, brought only nominal union of that land with Germany (*see* Holy Roman Empire). Even the rise of the powerful city states —Florence, Venice, Genoa, Milan, and their fellows—helped on the division and weakness by adding another disintegrating factor to the age-long conflict of Papacy and Empire. The epoch of French and Spanish rivalries for Italy began with the triumphal raid of Charles VIII of France through the peninsula to Naples, in 1494. It closed with the recognition of the Spanish rule of Charles V over Sicily, Naples, and Milan, in 1544.

Thenceforth the bustling Greek-like cities of Italy, in which the Italian Renaissance had flowered in masterpieces of literature, art, and science, stagnated under petty ducal houses. French Bourbons supplanted Spanish kings in Sicily and Naples in 1738; and the French Revolution and the conquests of Napoleon for a time overwhelmed the peninsula like an avalanche. But Bourbons and petty dukes alike came back, in 1815, with the added incubus of Austrian rule in Lombardy and Venetia. It was only the mighty labors of Mazzini, Cavour, Garibaldi, and Victor Emmanuel, in the glorious time of the *Risorgimento* ("the Reawakening") that finally brought to Italy the blessing of freedom and unity which it now enjoys.

ITALY *in all* HER GLORY



"Who has not seen the picture of the miraculous Cathedral of Milan? Once we have seen the picture of this place we must remember it always, but the picture shows not half its wonders. We climb up the heights and grow more bewildered as we climb, for if marble statues grew like trees and this had been a forest, it could hardly be more astonishing than this maze of human art —marble statues everywhere, marble figures, columns, groups, animals—a very forest of marble pinnacles and on every pinnacle a statue of life size."

TO THE traveler who has seen much of the world the thought of Italy comes like the return of years gone by. It comes like the rolling back of the Past.

It is not true that the Past has gone forever, for it lives in the human mind, it is built up into the Present, it marches on into the Future for which we live, and towards which all the hours of our lives are moving. And the thought of Italy is like the coming back of the Past to him who has been in that great land, for Italy is the land of the magic Past. Nowhere else does history unfold so proudly and solemnly before us.

It is like a casket of rare jewels, this glorious land, like jewels heaped on jewels, and the mind wanders when we think of it—now to Rome, where we seem to walk again in the spacious days of Caesar; now to Pisa, where we turn the corner of its clean white streets and look upon a vision that has moved the hearts of men for century after century; now to Naples, where Pompeii is turning over in the sleep of ages; now to Venice and the glory that is greater than words; now to Florence, the little heaven set up by human hands upon the earth.

From one place to another the mind of man runs, yet they are only as the peaks of a mountain range. Between them, from Venice to Naples, in that long strip of earth guarded by the rising mountains and the rolling sea, lie more wonderful places, more marvelous things, more mighty works of the hand of man, and more deathless memories of the human race, than can be found in any other land beneath the sky. Let us run to one or two of the places and look at one or two of the things that have made this land immortal. It is not the richest land on earth, but it has laid up a treasure upon earth that moth and rust will not corrupt.

Still its ancient cities ring with the hammer of Michelangelo, still we seem to catch the music of Giotto's dream. The sweep of Raphael's brush is fresh upon its walls; the children of Della Robbia look down upon its floor; the tenderness of Fra Angelica haunts its cloistered shades; the images of Donatello give out their inspiration still. And from every corner of this magic land the wonderful towers rise high toward the sky. They point upward and upward, and they tell of the striving of man to reach the mighty heights. How high the mind of man has climbed in this land no words can tell.

The American traveler reaching Italy will surely call at Turin and climb to the height where travelers go a thousand miles to stand. Here lie the kings of Sardinia, in a tomb fit for kings, and fit for better men than most of these; but we bother little about the tombs, for in front of us and around us are the Alps, the mighty natural treasures of this Treasure Land, hundreds of miles of Alps, set up there for us to see them at a glance, with their snowy peaks in the clouds a hundred miles away.

contained in the Easy Reference Fact-Index at the end of this work

One of the great modern towns of Italy is Turin, but there is nothing the traveler badly wants to see after the great view from the Superga; and soon we are in the train again for the ride by the Mediterranean, a journey unsurpassed, perhaps, in Europe for historic interest and natural majesty together. Through mountains and over them we go, past medieval towns and ruined castles, through ravines, over rivers and along embankments, in and out of 20 tunnels, before we come to Genoa and catch a glimpse of the great harbor, with nearly 500 acres and seven miles of quays, where a boy named Columbus used to watch the ships go out, already dreaming of what wonders might lie beyond the western sea.

No Sunlight for Centuries!

A striking sight the houses of Genoa are, rising so high that not for centuries has the sun peeped into these narrow ways, and so built up to one another that even an earthquake could hardly shake them down. Pressed in between the high hills and the sea, Genoa could grow only upwards, and up she has grown, with houses piled up like boxes.

We hurry past in our train, now on the most splendid part of all the road to Rome, the road from Genoa to Pisa, on the very edge of the blue Mediterranean. It is like a paradise on earth, this Italian Riviera! Nearly a hundred tunnels there are, piercing these cliffs, and each one brings us into some new scene of glory. Mountain villages, olive woods with their restful green, the rocky coast which Byron loved and where he wrote, the little bay where Shelley was boating when he was drowned, and the town where Byron burned his body on the shore, the green cypress trees that give a dreamy look to every place, the yellow broom and the orange trees with their golden balls—these and the blue sea all the way make up a matchless ride.

The Famous Quarries of Carrara

Wonderful it is to see the castles perched on these mountain peaks, and the little garden patches on the rocky slopes! Everywhere the peasants of this mountain land snatch bits of earth from Nature, even from rocks of marble, as here at Carrara with the marble mountains, which thousands of men spend their lives in cutting up. For centuries men have been cutting up these mountains, and now from 600 quarries they cut out 400,000 tons of marble every year, while artists sit in their studios near by carving statues out of it, and builders everywhere, near and far, build town halls and cathedrals of it. But men may cut for centuries, and centuries may come and go and the mountains will still be there.

Seven hours from Turin lies a sweet little place, clean and white like a room that has been spring-cleaned, and as we run across the plain there comes into view a tower that seems to be falling. It is Pisa.

Beautiful little Pisa! We can walk round it in an hour or so, yet this little place was once a mighty state, a place of strength with a proud story behind it, when England was still a petty kingdom.

Time was, before the sea left Pisa, when this little state kept the infidel out of Europe. The power of these Italian city-states was wonderful, and Pisa only lost her power by the treachery of an admiral. But she had a proud story before this sound of doom fell on her ears, and she put up a famous group of buildings as a thanksgiving.

We turn round the corner of a narrow street and come upon them, as fair a scene to look upon as anything man can dream. It is a thing for tears to remember that men could build such monuments as this 700 years ago, and that in the World War men were blowing things like this to pieces! The wonderful cathedral, with one of the longest transepts in Europe; the baptistery, with a pulpit among the rarest treasures of the earth; the majestic campanile or bell-tower, with no visible imperfection except that it is leaning—as if it were tired after 740 years—remain without a rival as an architectural group, though centuries have come and gone and Michelangelo has lived and died since these stones were set in their places. All the world has heard of the Leaning Tower, which served Galileo, who used to walk about these streets, for one of his great experiments; but it is said that this great campanile was only one of ten thousand towers built in the great days of Pisa!

The Beauty of Pisa's Cemetery

But there is another thing in Pisa that lingers in the memory of those who have been there. If beauty and simplicity make a place sacred, it is one of the holy places of the earth. It is the Campo Santo, the little graveyard where for centuries the great men of Pisa were laid to rest. There are precious pictures round the cloistered walls, and many other priceless merits artists have put here too; but it is the pure and simple dignity of this little garden that we can never forget. So near as men can make it, it is perfection, perhaps the sweetest little cloistered place on the continent of Europe, where a man who has come from the busy world may rub his eyes and think it all a dream.

The very earth on which we tread in this sweet place has come from Calvary; long before the ships of England brought pilgrims to America the ships of Pisa had brought earth from Jerusalem to make a garden here. A great imagination Pisa had, and the Campo Santo is its monument. Death was not a cruel thing to them. They lived their day and did their work, they left their mark on the sands of Time, and they laid them down to rest.

There are travelers who like it better, this home of sleep at Pisa, than the house of sleep that lies far off in northern Italy, and is known to all the world as Milan Cathedral.

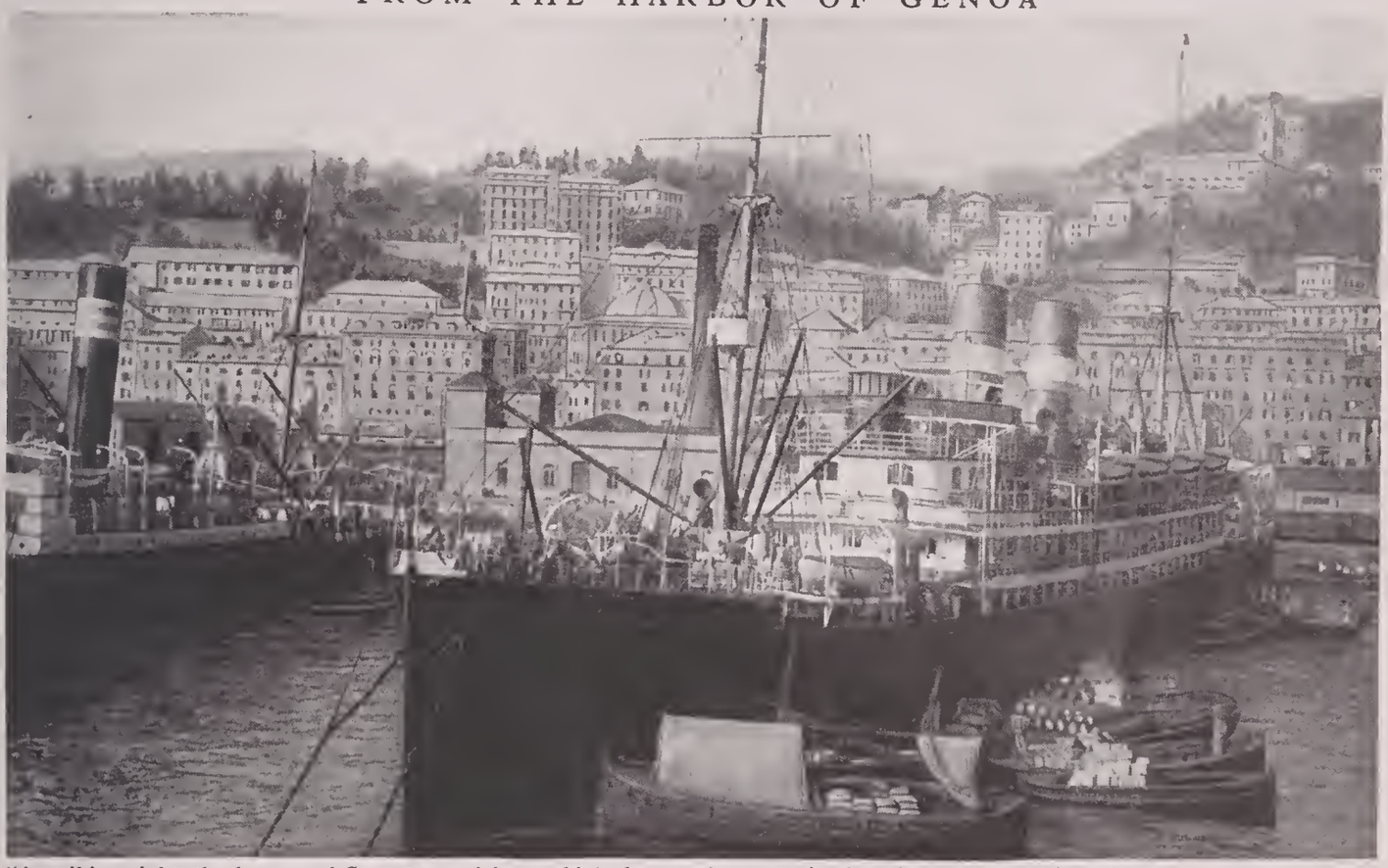
Who has not seen the picture of the miraculous cathedral of Milan, the noblest thing of art in the great industrial area of Lombardy that Milan dominates? Once we have seen even the picture of this place we must remember it always, but the picture shows not half its wonder.

Remember that this great place is made of white marble, and that if you saw a thousandth part of it—any thousandth part of it, almost—by itself, you would say, "What a beautiful thing! What infinite patience!" It is not the interior of it that is wonderful. What you can never get out of your mind, once having seen it, is the mazing, almost magical, effect of the exterior. Nothing else is like it; a thousand years or two before and it would have been among the Seven Wonders of the World. As a triumph of human labor it seems to drive the Great Pyramid to the back of our mind. The Pyramid was the work of a hundred thousand slaves, hewers of stone and drawers of it, and, from the first moment of that Thirty Years' Tragedy to the moment when the last stone was laid, there was not one spark of soul put into it. But the burden of labor at Milan Cathedral must have been as great as the labor of the Great Pyramid, and *behind every stroke of the chisel there was a mind!*

Words do not convey an impression of this miracle of mind in marble. Climbing its dizzy heights, we picture a mountain of marble somewhere far away. For millions of years the marble mountain had been in the crucibles of God before it rose complete; and one day Man said to this mountain: "Be ye removed and re-made. Let your majesty be renewed with beauty, and your strength with grace. Be removed to the heart of a great people, transplanted and transformed, so that for all time you may witness to the strength of the eagle, the tenderness of the lily, and the delicate touch of the hand of a man."

We climb up the heights of this vast place and grow more bewildered as we climb, for if marble statues grew like trees and this had been a forest it could hardly be more astonishing than this maze of human art—marble statues everywhere, marble figures, columns, groups, animals—a very forest of marble pinnacles, and on every pinnacle a statue in life size. There are over 2,000 statues, more than would furnish a gallery and make it famous, and we climb up and up among them until a mortal man can climb no more without resting; and still, after resting, we climb again until the very thought of our height makes the head swim!

FROM THE HARBOR OF GENOA



"A striking sight, the houses of Genoa are, rising so high that not for centuries has the sun peeped into these narrow ways, and so built up to one another that even an earthquake could hardly shake them down. Pressed in between the high hills and the sea, Genoa could grow only upwards, and up she has grown, with houses piled up like boxes."

And yet all this glory is but a tomb. Down below the dizzy heights, through a heavy door at the foot of 15 steps, down which we find our way in the hazy glimmer of a candle, lies the central point of all this wonder, the inner heart of Milan. We step softly, with a sort of half-fear and half-wonder, into a tomb of solid silver, with wondrous carvings everywhere about, though we have hardly time to see them. We promise the sacristan five francs for the poor and five more for the sacristan, and listen to the creaking of a windlass as a great screen moves down.

What is it that is happening? What new and hidden wonder lies in the dark chamber of this won-

derland? Slowly the screen falls, and as it falls there comes before our eyes a sight that surely is unequaled in this world. The dim light of a candle falls on glittering treasure worth, they say, about $800,000. Here is an emerald cross, the gift of an empress, and precious jewels lie about as if they were but stones. The creaking of the windlass stops, the candle is held up higher, and its flickering light falls on something strange and hideous in the heart of this glittering treasure. Here—treasure to the right of him, treasure to the left of him, treasure beneath him and above him, dressed in silken robes of gorgeous coloring, with a jeweled cross on his chest and ruby rings on his hands—lies Saint Carlo Borromeo, once Cardinal Archbishop of Milan and a famous enemy to Protestantism, but now an ugly shriveled-up old man, his eyes fallen from their sockets, sleeping in this glittering chamber surrounded by the gifts of kings and the pomp of one of the most impressive buildings in the world! At the summit of the highest of its hundred pinnacles, the golden figure of the Mother of Jesus glitters in the sun; in a cellar, 400 feet below, a hideous corpse glitters in diamonds and rubies and pearls!

WHERE THE BONES OF ST. ANTHONY LIE



The Basilica of St. Anthony is the most famous of Padua's famous churches. In a chapel in this church, richly ornamented with carved marbles, the work of several famous artists, the bones of the Saint were laid away. The Basilica was begun about 1230 and finished in the following century.

It is true that this tragic note of Milan is often over us as we go through Italy; a boundless hope and the tragedy of despair mingle strangely in this land. We see these mighty splendors of the past, but we see them rising through ruin unparalleled from the terrible wreckage of an empire, and we remember that Rome was a failure. From no other land does the traveler come home with a greater sense of the tragedy of the past, but from no other land does the traveler come home with a greater reverence for the mind of man and the heights that it has reached. It is as if the human mind in Italy had modeled itself upon the Alps that guard this kingdom of beauty, as if men had been striving through the centuries to match the mountain peaks.

Stripped of all the legends and fables that have grown about it, how wonderful Italy is! Somebody has said that the singing of nuns sounds like angels in Rome, and it is true that life seems half a dream as we walk about in these great cities—in Venice and Verona and Florence and Pisa and Siena and Assisi, and a score of other places famous for their works of wonder. Here we cannot hope to touch them all, and you may read elsewhere of Rome, the wonder-city of the earth; but we may glance at two of the fairest jewels in Italy's fair crown — Florence and Venice.

It is one of the wonders of Italy that her treasures are so often out of doors. There they stand in the sun and the rain, and we may take as our great example this astonishing city of Florence.

He who has been to Florence will never forget it while his memory lasts. It is like a poem that would not come in words and was written in stone, and the names of its poets are legion. Its squares are little worlds of art. Its shops are packed with gems. The doors of its churches hold the traveler fixed in front of them. Its towers rise to the sky like things not made with hands. Its streets are guarded by silent sentinels that have stood there through ages. Its great houses stand as if they were built forever. Its walls are hung with pictures that Time will not let die. Like awaking from a dream it is to turn away from Florence and step into a train; like walking through five hundred years, from one world to another.

THE BEAUTIFUL CITY OF THE DEAD IN GENOA



Italy is famous for the beauty and interest of its cemeteries and this is one of the most famous of them all, the Campo Santo Cemetery in Genoa. The Italian people take so much pride and delight in the cities of their beloved dead that the famous French writer, Bazin, calls them "funereal pleasure grounds." Of the parts of the cemetery occupied by the tombs of the wealthier Genoese, he says: "Nowhere is the stone made so supple, required to represent so many family scenes, so many trained and ruffled gowns with marvelous imitations of lace. These Italian cemeteries are like a great album of departed generations." On the tombs are frequently kept burning "tall night lights in colored glass; and always the bust, with spectacles, if the dead man wore them; or the photograph, framed and protected by glass."

Around Giotto's tower the city lies. Around the shepherd boy's immortal monument, Florence has grown up, as it were, in the bottom of a basin, and majestic hills wind round about it as if to defend it from the ordinary world. We look up at his great white tower and think that surely nothing lovelier has ever risen from the ground.

The foot of this tower, says John Ruskin, is the one spot out of Palestine where, if we know anything of the world's history, we feel the dawn of the morning of the world. Behind us is the last building set up on earth by the men who learned their work from Pagan teachers. In front of us is the best building set up on the earth by the men who learned their work from Christian teachers. Something like that John Ruskin said, and somehow it seems, even to the ordinary passer-by that there is something of the wonder of Dawn in the Lily Tower.

It rises in the heart of Florence, straight from the street where the children play, and it climbs up towards the clouds. It seems to us, as we look up at it, that it rises to the height of the mountains all around, and it is inseparable from any vision of Florence that we can have, or that any man has had for 20 generations. If we are young and not tired, perhaps we run up to the top of the tower; but it is 276 feet high, and perhaps we are content to go a little way and look out through the open windows to get that lovely peep of Florence through the niche where John Ruskin loved to look down on it. Or perhaps we are content to stand below and let our eyes run slowly to the top. A hundred things there are for the eyes to rest upon, from the little sculptured pictures of the history of the world just above our heads, to the stars in the blue domes at the top, which shine at night like stars in the sky.

Those who love a human story stop again and again to look at the picture of Giotto's dog, the little friend who helped the shepherd boy to find his sheep, whose comradeship in the fields Giotto never forgot, so that when he came to build this tower and to chisel these pictures round it, he chiseled the picture of his dog and put the faithful creature there for all to see, although of himself he set down not so much as a mark or a name.

We shall be eager to pick out, also, those great statues by Donatello, who helped to furnish Giotto's tower as he helped to build Brunelleschi's dome. It

was Donatello who dropped Brunelleschi's dinner when he saw a statue his friend had made more lifelike than his own. But he pleased himself at last, and here, high up in Giotto's tower, stands one of his figures in particular, with which it is said he was so pleased that when he put down his chisel he slapped the statue lightly, pretending to be angry with it, and said, "Speak!"

Beside the tower stands the Duomo, the great cathedral of San Maria, with a front which looks plain in pictures because of its straight lines, though its thousands of pieces of black and white marble make an impressive and majestic mosaic. The front is modern, belonging to our own time, but the cathedral behind it goes back to the days when Giotto was building and Dante was writing, 600 years ago. The great bronze doors, with Bible mosaics above them, are almost perfect things; but it is the beautiful dome that Brunelleschi made, to which he gave many years of his life, and then died before it was finished, that crowns the great cathedral. We look down on it from every hill round Florence; it shares the glory of Giotto's tower.

THE BAPTISTERY AT PISA



The Baptistery at Pisa is a circular building 100 feet in diameter. On the cone-shaped dome is a statue of St. Raniero. It was begun in the 12th and completed in the 13th century.

Across the street from the cathedral, behind us as we look up at the tower, is the baptistery, the quaint old cathedral built before England had won her Magna Carta, where, for more than a thousand years, every child of Florence has come to be baptized. The old cathedral has been replaced by the new, but nothing new can ever replace its three pairs of bronze doors—especially the two modeled and cast by Lorenzo Ghiberti.

The sun has been shining on them, the rain has been pouring on them, for nearly five hundred years. In the open streets of Florence they stand, perhaps the most famous gates in the world. Ghiberti first spent 20 years in making the pair which stand in the north side of the building, and when it came to the casting he set up a furnace in a little street close by and obtained for his workmen permission to carry lights about the streets at all hours of the night. When these doors were finished they excelled anything of the sort the world had ever seen. After that Ghiberti set out to work for 27 years more, and produced his second pair of doors, which face the great cathedral across the plaza. They surpass his earlier gates as much as those excelled anything else in the world. A few years later there was born in a house near by a child whose name was Michelangelo; and when he had grown up and become the greatest artist of them all, Michelangelo passed these gates and declared them "fit to be the gates of Heaven!" (*See* Ghiberti.)

All these things are round about us. Standing in one place we look upon the baptistery, the cathedral, and the tower; and not more than a few minutes away from us, in front or behind, to right or to left, are houses and churches and monuments, palaces and museums, which we could visit for weeks together without tiring of their wondrous beauty.

There are not many houses in the world like the great Strozzi Palace, rising from a narrow street on bowlders so big that they remind us of the pyramids, and looking as if it would stand unmoved in its place as long as Time shall last. We turn back again and again to look at this great house, 400 years old and more, with some of its bowlders ten feet long.

There is not anywhere, perhaps, a more beautiful courtyard than that of the Bargello Palace, once the home of the chief magistrate of Florence. Its glorious stairway, open to the sky, is one of the things that no visitor to Florence can fail to see. Nor is there

anywhere else another building like the Palazzo Vecchio (Old Palace), a battlemented castle which was once the seat of government for the republic, then the residence of the Medici dukes, and now the town hall. Six hundred years ago and more the dream of this place came into the mind of Arnolfo di Cambio, who half built it before he died.

Florence has two towers—the stern slender rugged tower of the Vecchio Palace, that looks almost as if it would fall, though it is like the rock of ages; and the great white tower by the cathedral, which surely will never fall, though for its beauty and daintiness it is like the lily of the valley. And the first of these towers, rising from the Vecchio Palace, grows from the foundations that were planned by Arnolfo; the second was planned by the shepherd boy named Giotto.

THE COURTYARD OF THE PALAZZO VECCHIO



The Palazzo Vecchio or "Old Palace" was built at the beginning of the 14th century to house the government of Florence. Today it is used as the City Hall. In contrast with the severe grandeur of the exterior, the courtyard of the palace is elaborately decorated in the later Renaissance style. Of special interest is the fountain in the center. The basin is of porphyry and the figure of a boy with a fish above it was made by the great sculptor Verrocchio. Above the colonnade are carved armorial bearings. The coat of arms above the pillar to the right is that of the Medici, who once lived in this magnificent old palace.

We look up at the Vecchio Tower from the great square where Savonarola was burned to death. On our right is the prettiest of all those art galleries in the open air which are one of the beauties of Florence. It is the Loggia dei Lanzi, an open hall with a vaulted roof, where for many generations great solemn ceremonies have been held before the people. Here is the splendid bronze statue Benvenuto Cellini made 350 years ago. It was impossible, so his rivals said, to cast in bronze a statue so designed; and the triumphant artist, burning all he could lay his hands on, nearly killed himself in his resolve to melt the metal at any cost, and cause it to flow into the remotest part of the mold. Here also is the great bronze monument of Judith with the head of the tyrant Holofernes. No money in the world could buy from Florence these sculptures, which stand in the open street for the wind and the rain to beat upon and for every poor boy to see.

We pass from them between the two sides of the great Uffizi Palace, and at every step we are held by the statues which lie in this beautiful way—the two lines of figures, standing in the niches of the walls, of the great makers and dreamers of Florence. We look on them, and around us we look at their work, and we think ourselves back in the times when they lived; or perhaps our thoughts fly across the world home to America, for here—a surprising little discovery to make—is Americus Vespucius, who found America after Columbus, and after whom the continent was named. We pass beyond the statues, under the archway, into the famous Lung' Arno, the street by the Arno. And perhaps nothing strikes us,

as we walk along the river, more than this great Uffizi Palace, stretching from the Vecchio Palace behind us—through which we enter it—winding round the courtyard of the statues, following us down the Lung' Arno to an old, old bridge (the Ponte Vecchio), where it turns the corner and crosses to the other side. Then the Uffizi Palace veers round and rambles in and out of narrow streets, past a lot of little houses, climbing up and diving down, till at last it reaches a sort of park, with the most amazing evergreen ways, most spacious gardens laid out by the Medici, with fountains and statues and a great amphitheater, until it becomes a palace indeed, having joined the Pitti Palace beyond the river, with wide staircases, carved ceilings, and huge chambers full of treasure, with a front as big as the White House, and fifty times more noble.

Florence, A Great Museum

Florence is the Out-of-Door Museum of the World. If we can think of a museum as a town which has come together naturally, in a valley surrounded by hills, on the banks of a river, with not a glass case in it and not a single label stuck on, but with everything in its place and as it should be; not holding its head high with the pride of a stiff museum, but looking like what it is and what it was meant to be—if we can think of this, we can think of something like Florence, the richest gem, as somebody has called it, in the diadem with which the Italian people have adorned the earth.

Even out-of-doors Florence is almost inexhaustible to the traveler who can never stay long. Even in the streets we can stand and see the terra-cotta medallions of lovely children by Andrea della Robbia, whose matchless figures are still fresh in their blue and white on the front of the Children's Hospital; and for bronzes and marbles and carvings out of doors, no other place on earth can equal this.

In the great squares and streets of this town we walk about enthralled, and one morning, when the sun is high in the heavens, we climb up the hills across the Arno, and walk about these fortifications built by Michelangelo to keep the Medici tyrants out. Round and round we climb until, half-way up the hillside, we reach the square from which a bronze copy of Michelangelo's David looks down—a famous figure, immortal in the history of art, standing in splendor on a hill above the ancient town. The marble original of this beautiful young giant stands in the Academy of Fine Arts on the other side of the Arno.

Florence from the Arno Hills

From this hill we look down upon the city, closely packed with its great stone houses and its narrow streets; and its towers and churches and monuments lie all before us. And wherever we look the eye comes to the dome of the cathedral, crowning the heart of the city as the hills crown its circumference. The perfect combination of Brunelleschi's dome and Giotto's tower must be seen to be believed, and together they breathe the whole spirit of Florence. Something there is in Florence that suggests its inner growth. It was born in the Roman days and the commerce of the Middle Ages brought it wealth. It grew through storm and party passion to be a self-governing republic. It rose out of the blinding mists of family feuds. Its streets rang with the battle-cries of Guelf and Ghibelline. It has the mark of the anger of Savonarola, of the power of Lorenzo de' Medici, of the simplicity of Giotto the shepherd boy. The traveler who goes to Venice first will be glad he came that way. It is like stepping out of a drawing-room, where everything is so neat and delicate that we must hardly breathe, into a dining-room of solid oak, where we can sink on a heavy couch and feel that the house will stand. The name of the Lily Tower must not deceive us. It does not mean something pretty and dainty and small and white. It means something great and pure and lovely—a very Galahad of architecture. Florence is made of big and heavy things, its palaces are built of bowlders, its streets are flagged with stone, its towers rise high with great, sharp red-brown stones that a hundred generations may live to look upon.

Regretfully we leave this city of a dream. As the train slows out the dome sinks down, the towers fade away on the plain, and Florence is a memory. The poetry of Dante is in its air. The tenderness of Fra Angelico is in its pictures. The strength of Michelangelo is in its forts. The ruggedness of Arnolfo is in its palaces. The humanity of Giotto is in its tower. The dreaming of Brunelleschi is in its dome. The magic of Donatello is in its marbles. The power of the Medici is in its walls. The purity of Savonarola is in its everlasting beauty. The truth of Galileo is in its everlasting hills.

Florence holds the traveler like a magnet, but still there lies before him that city like a dream up in the north—Venice. How should one write of Venice?

The Wonderful City of Venice

Venice is a city—for centuries a widespread empire—that has grown up on the dust of the Alps, brought down by the rivers and cast into the sea. Into these islands formed in the lagoons of the Adriatic men drove huge piles, upon which they built magnificent palaces and churches.

They went on building until the islands were crowded, until scores of islands were linked by hundreds of bridges; and this wonder-city, rising from the sea, with the waves beating all around it, with the sea surging through its streets and into its houses at every highest tide, served as a central magnet, attracting to itself great dreamers and workers from the cities around.

Its commerce covered the Mediterranean and reached to the heart of Asia on the east and to the farthest limits of Europe on the west. Here came painters and sculptors and poets and preachers and builders and workers in mosaic, such as never before came together in the history of the world. Here,

THE BEAUTIFUL CITY BORN OF THE SEA



"Venice is a city—for centuries a widespread empire—that has grown up on the dust of the Alps, brought down by the rivers and cast into the sea. Into these islands formed in the lagoons of the Adriatic, men drove huge piles, upon which they built magnificent palaces. They went on building until the islands were crowded; and this wonder-city, rising from the sea, served as a central magnet, attracting to itself great dreamers and workers from the cities around." The soaring spire to the left is the bell tower or Campanile, overshadowing the domes of St. Mark's Cathedral. Between St. Mark's and the water-front is the Ducal Palace.

even long after the political and commercial ruin of Venice, came Byron and Browning, and Ruskin and Wagner. Here lived Tintoretto, one of the "five supreme painters"; across the little canal is the church where he lies. Here lived Paul Veronese, painting immortal poems of beauty on the walls of Venice. Here is the great monument in bronze of a mounted warrior, by the man who taught Leonardo da Vinci. Here, wherever we go, are treasures of art fashioned by the little armies of devoted men who, through the centuries, have added stone to stone until this wondrous monument of human genius has arisen from the waves. What builders they were! What dreams they dreamed! They worked better, perhaps, than they knew, each man putting his soul into the achievement of a splendid purpose, building up his mosaic with the true joy of labor in his heart; each inch of progress that he made lifting him higher toward heaven and bringing him nearer the lofty goal to which the whole inspiration of Venice was tending. That goal was the expression, in enduring natural form, of the loftiest conceptions of men; and Venice is, truly and in every sense, a city not made with hands.

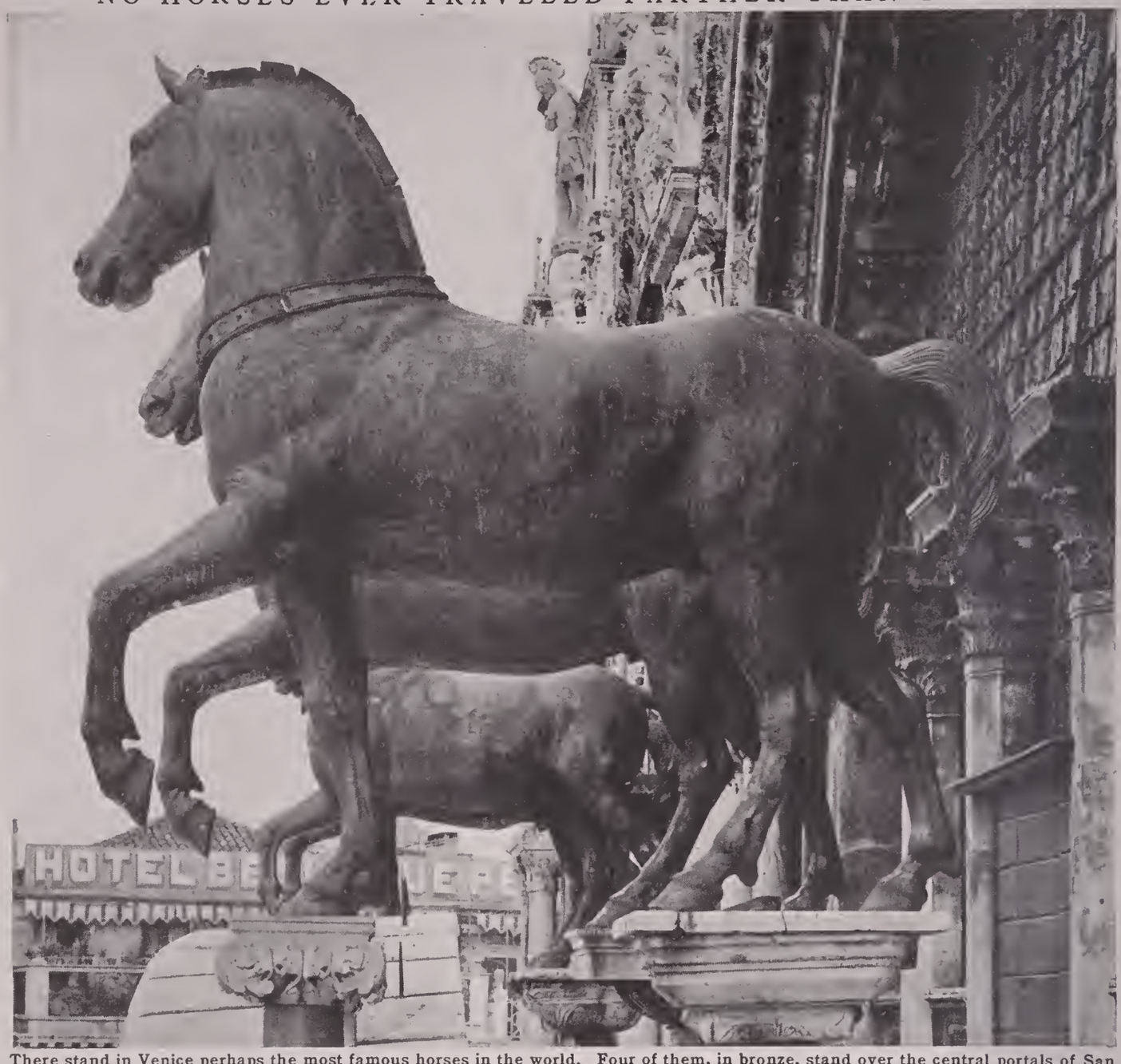
We feel this deeply as we approach the central glory of this place, the incomparable beauty of St. Mark's Cathedral. The apostle Mark was a humble man, but he is represented as a lion today and he lies in a veritable palace—if, indeed, his body *is* here. Within a foot or two of the tomb stands a screen made up of gems worth millions of dollars. Beyond it stand two pillars of transparent alabaster said to have come from Solomon's temple.

But it is not the screen nor the columns nor the wonderful history of everything about this place that thrills you when you enter and draws you back when you would leave. It is the wonder of the place itself. It is said to draw together the three supreme elements in art, and to be, from this standpoint, the central building in the world.

Viewed from either of its two main approaches, St. Mark's is a dream in stone. Its gilded domes and turrets, its marvelous mosaics, its unlikeness to almost everything else in Europe, are as nothing compared with the interior. We enter through one of the six great doors, and we see that St. Mark's is laid out in the form of a cross. It is not so big as the Milan Cathedral, which holds 40,000 people; but its arches and altars and numerous domes take our breath away.

The upper half of the interior is gold, and the scenes in the life of Christ, in beautiful colorings, have thus a perfect setting. You sit and dream here with your eyes wide open, staring at the paintings in the domes, the arches, and the ceilings, and you wonder how many millions of others have sat and dreamed here, too. Then you go upstairs, and walk around it all, to find that the whole of that wonderful work, the entire upper half of St. Mark's, save some part that

NO HORSES EVER TRAVELED FARTHER THAN THESE



There stand in Venice perhaps the most famous horses in the world. Four of them, in bronze, stand over the central portals of San Marco looking out upon the square. They were made at Corinth nearly 20 centuries ago. Nero took them to Rome, Constantine to Constantinople; thence they were moved to Venice. Six hundred years later they were carried by Napoleon to Paris. After Napoleon's fall, the horses were returned to San Marco, and during the World War they were taken down once more and hidden away.

must be solid, is mosaic! Inch by inch, half-inch by half-inch, this wonder of the world was made; half-inch by half-inch these almost countless pictures were built up. You pause before a fine mosaic which Jacob somebody worked at hundreds of years ago, sitting uncomfortably at a great height for months, but leaving his work behind him at the last to live as long as Venice. They cover an area, these wonderful mosaics, of nearly 50,000 square feet, and some of them are nearly a thousand years old.

There are people in Venice who have never seen a horse; it may be true that no horse's hoof has ever been heard in this city's streets; and yet there stand in Venice perhaps the most famous horses in the world. Four of them stand in bronze over the central portals of San Marco, looking out upon the square; and on another sits the noble warrior Colleoni, in the monument mentioned above.

The four horses of San Marco were made, it is said, by an unknown artist at Corinth, and set up nearly 20 centuries ago. Nero saw them, and took them to Rome to adorn his triumphal arch. Constantine took them to his capital when he set up a new Rome at Constantinople. Thence they were moved to Venice when the Venetians sacked Constantinople in the Fourth Crusade. Six hundred years later they were carried by Napoleon to Paris. After Napoleon's fall the horses were returned to San Marco, and during the World War they were taken down once more and hidden away. Now they are home again.

As for Colleoni's horse, John Ruskin called the statue the noblest equestrian monument ever set up on the face of the earth. It stands on a great high pedestal by the Church of St. John and St. Paul; these two great monuments—the church with its great men sleeping, the horse with its rider sternly gazing over Venice—have been side by side for more than 400 years. Bartolommeo Colleoni, a general of the Republic, sleeps at Bergamo, but he left his fortune to Venice in return for a statue in one of its squares, and it was Andrea del Verrocchio, one of the great sculptors of Florence, who was entrusted by the Republic with the carrying out of this commission.

Verrocchio and the Horse's Head

Verrocchio went to Venice to make the statue there, and the story is told that he had just modeled his horse when he heard that the government of Venice meant to ask a scholar of Donatello to set the rider on the horse's back. Verrocchio was indignant. He broke his horse's head to bits and went home to Florence, and there followed him a decree forbidding him ever to set foot in Venice again under penalty of death. But artists can always laugh at governments; they have a power that politicians know not of. Verrocchio smiled at the decree of the proud Republic, and wrote back that he would never run that risk, as, if his head were once cut off, the government of Venice could never put it on again, while he could at any time replace his horse's head. The government of Venice felt that this was true. They canceled their decree, begged Verrocchio to return, doubled his fee, and promised to leave him alone at his work.

He came back to Venice, and resumed his work; but he had barely completed his model when a Power that neither men nor governments can contradict carried the artist to his grave after a short and violent illness. He left behind him an appeal that one of his pupils should be employed to cast his work in bronze; but Venice chose Alessandro Leopardi; and so we owe to these two men—Leopardi of Venice and Verrocchio of Florence—the carrying out of a monument which, once seen, has never been forgot.

On Guard through the Centuries

They set up the statue overlooking the Grand Canal, and there, high up on its beautiful pedestal, this noble horse has borne its rider, watching the centuries in and watching them out. It has been the admiration of all the traveling world, and the heroic and helmeted figure of Colleoni, in his armor as a leader of troops, is one of the great figures that have come down to the modern world from the times before Shakespeare wrote of these waters that ripple past the square, and of Shylock who haunted the Rialto close by.

He sits as if he were the guardian of the glory of the world, and indeed he is. Unequaled on the earth is Italy, land of wonders old and new, with treasures of which not half the splendor and the glory has ever yet been told.

IVAN, GRAND DUKES AND CZARS OF RUSSIA. Six rulers of Russia have borne the name "Ivan," the Russian for John. Some of them ruled before the country was called Russia, and they were known as the Grand Dukes of Moscow. The foundation of the modern state of Russia was the work of the third and fourth rulers of the name.

IVAN III, who ruled from 1462 to 1505, freed his country from the Tatars by refusing to pay tribute to the Great Khan. He conquered the wealthy city of Novgorod and annexed it with many other cities and states to his dominion. He took the title of emperor and adopted the double-headed black eagles as the Russian arms. Because of the importance of his work he is known as "Ivan the Great."

IVAN IV, during his reign from 1533 to 1584, earned the title of the "Terrible" by the insane cruelty he manifested at times. Once in a fit of anger he even killed his own son. But Ivan IV, like Ivan the Great, was also a man of great power. He extended his dominions south to Astrakhan on the Caspian Sea and north to the White Sea, and on the east he added Siberia. In 1547 he formally took the title of Czar (Caesar), and laid the foundation of the autocratic government under which Russia was ruled for nearly four centuries.

IVORY. Imagine a parade of elephants 150 miles long—an elephant army of 40,000 filing past you in close order for nearly six days and nights! That is the number of elephants that must die every year—including those dying a natural death and the 20 per cent or so slain by hunters—to supply the 1,000 tons of ivory imported from Africa and Asia annually by London and Antwerp alone, the chief ivory marts.

True ivory is obtained only from the tusks of the elephant, generally the male. The tusks grow during the animal's entire life, usually attaining a length of several feet and a weight of from 15 to 200 pounds or more a pair. Ivory for commercial purposes is also obtained from the teeth of the hippopotamus, walrus, narwhal, sperm-whale, and wild boar, and from the vast stores of fossil remains of prehistoric animals, such as the mammoth, which are still found in Russia, Siberia, China, and Alaska.

Some of the Uses of Ivory

From ivory are made billiard balls, piano keys, combs, brushware, toilet articles; knife, umbrella, and door handles; napkin rings, paper cutters, little book covers, statuettes, crucifixes, chess men, etc. It is so elastic and flexible that excellent riding whips have been cut lengthwise from whole tusks. The pores are close and compact, and filled with a gelatinous solution which contributes to the beautiful polish which may be given to it and makes it easy to work. It has a peculiar marking, a cross-section showing many lines of different colors running in circular arcs, resembling the engine turning on the case of a watch, by which it may be distinguished from imitations. It is classified as hard ivory and soft ivory, the former being the more glassy and

transparent and harder to cut with the saw. Ivory is extremely sensitive to sudden changes of temperature, and for this reason billiard balls should be kept where the temperature is fairly equable. Soft ivory contains more moisture than hard ivory, stands differences of climate and temperature better, and does not crack so easily.

So valuable is ivory that no part of it is wasted. Sacks full of cuttings and shavings are sold to be used for inlay work. Even the dust is used for polishing and in the preparation of India ink. The most valuable ivory—that of the African elephant—is demanded for billiard balls, three balls of best quality usually being obtained from one tooth.

Ivory in Ancient Times

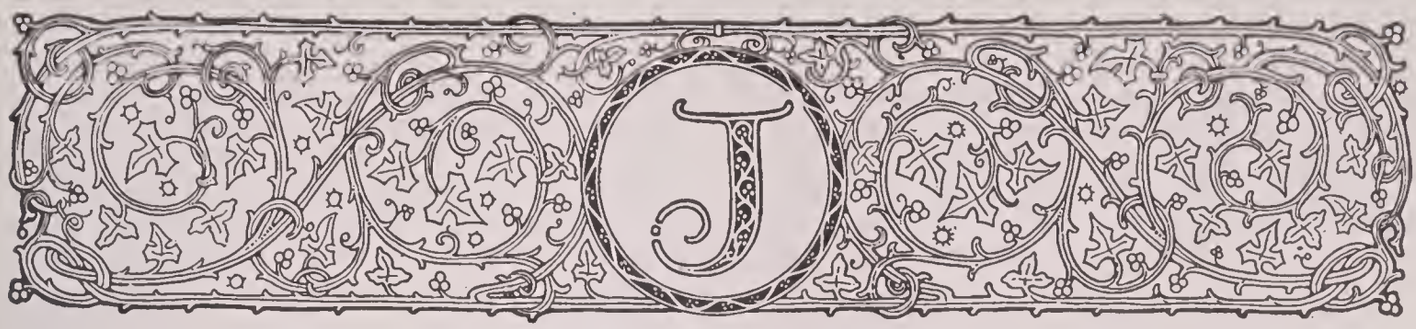
The use of ivory can be traced to prehistoric times. We read that King Solomon "made a great throne of ivory." There still exist examples of inlaid Egyptian ivory, and in the British Museum are many Assyrian ivory carvings made in Nineveh nearly 1,000 years before Christ. In ancient Greece ivory was used for carvings, sculpture, and various objects of luxury. The sculptures in ivory of the Gothic art of the 13th and 14th centuries are distinguished for their beauty. Ivory mirror cases, caskets for jewelry or toilet purposes, and other articles were carved with scenes from real life or illustrations of the romances, which set forth vividly the dress and customs of the times.

Vegetable ivory is a material resembling ivory obtained from a palm native to tropical South America which throws up beautiful leaves like ostrich feathers, 10 to 20 feet high. The fruit, about as large as a man's head, contains numerous nuts or seeds, called corozo or tagua nuts, which when ripe are so hard they make a valuable substitute for ivory. They are much used for buttons, umbrella handles, and similar purposes. There are also various artificial compounds which resemble ivory, such as celluloid.

Ivy. About 50 comparatively hardy vines growing in moderately cool regions of the northern hemisphere, which botanically differ rather widely from one another, are called by this name. They climb by means of sucker-like disks which attach themselves to walls and trees or by means of close twining tendrils. The waxy dark-green leaves of the common or English ivy turn to vivid hues of scarlet and yellow in the fall, as do those of most other varieties. The small greenish flowers are succeeded by smooth black or yellow berries. Contrary to common belief, ivy does not ordinarily injure its means of support. A fair growth of ivy on sound walls promotes dryness and warmth, reduces weathering, and adds beauty. However, an excessively heavy growth upon a tree may strangle it.

The ivy has always been a symbol of the clinging love of woman. The altar of Hymen, the Greek god of marriage whose blessing was invoked at every wedding, was kept green with ivy. When Isolde, in the old Irish legend of Tristan and Isolde, immortalized in Wagner's opera, died lamenting the death of Tristan, King Mark, in his anger, buried them apart; but an ivy growing from the breast of Tristan met another growing from the grave of Isolde, and the two vines, entwining, convinced the king that the union of the lovers was pure and undying and caused him to repent of his anger and bury them together.

In addition to the common or English ivy (*Hedera helix*), there are the African or Irish ivy (*Hedera canariensis*), which is the common large-leaved climbing ivy; the Japanese or Boston ivy (*Ampclopsis tricuspidata*), a graceful, easily kept vine; the Virginia creeper (*Ampelopsis quinquefolia*), often wrongly called woodbine, a common species with five-lobed leaves which grows wild or can be cultivated. The North American poison ivy (*Rhus toxicodendron*) resembles the Virginia creeper but has 3-lobed leaves poisonous to the touch; it is really a sumac. The ground ivy (*Glecoma hederacea*) is a small creeping plant with bluish purple flowers.



JACKAL. Southern Europe, Asia, and northern Africa are the home of the jackal, a doglike animal smaller than a wolf and of less savage habits. It has a pointed muzzle, like a fox, and a bushy tail about one-third the length of the body. The common jackal of southern Asia is the best known. It is grayish yellow in color, darker above and lighter on the under side.

During the day jackals remain concealed in burrows, caves, and jungles, coming out at night to hunt, usually in large packs. They utter a piercing unearthly cry, and the howling of a pack at night makes an appalling chorus, familiar in oriental villages. They feed on smaller mammals, poultry, fruits, and especially carrion, quarreling over the latter with the vultures. They shadow wounded animals and haunt battlefields and burying-grounds. When running in packs they often attack sheep and antelopes. They are easily tamed, and probably represent one of the breeds from which the domestic dog is descended. Jackal hunting with fox-hounds is a popular sport in India, as these animals are cunning and fight furiously when cornered.

Scientific name, *Canis aureus*. The jackal resembles the wolf and dog in its teeth, round eyeballs, and to a large extent in its habits. The range of the common jackal extends from Dalmatia to India. Like the fox it has an offensive odor due to secretions of a gland at the base of the tail.

The FRONTIERSMAN *Who Became* PRESIDENT

"Old Hickory," a Product of the Wilderness Who "Kept His Bark On"—His Forceful Character and How He Rose to Power as Spokesman of the West

JACKSON, ANDREW (1767–1845). When Andrew Jackson came upon the stage of American political affairs as the seventh President of the United States, a new era began in the history of the country. The control of the government by the "Virginia dynasty" and the Adams family was at an end, and the rule of the frontier had begun.

As a specimen of the new type of American manhood which was now to dominate the country, no better person could be found than Andrew Jackson. The son of Scotch-Irish parents who had settled in the frontier wilderness of the Carolinas shortly before his birth, he displayed the characteristics of the Waxhaw region in which he was born and reared. He was uneducated, crude, and fond of fighting; but energetic, self-confident, honest, and straightforward. Ardently loved by his friends, he was just as cordially hated by his many enemies — a hatred which he abundantly returned.

Jackson's lack of education was due not only to the poor schools on the frontier, but also to his own indifference to books and to his unwillingness to be taught. He never learned to speak or write correct English, and one of his enemies once said that "his letters, with their crudities in spelling and grammar, would make the better educated angels weep."

During his whole life Jackson could wield the sword more readily than the pen. Tradition tells that of all the wild boys of the neighborhood he was the wildest, and that he was proverbially ready for a quarrel, a readiness which in later life involved him in numerous duels. When he was 13 years old he found a good cause for fighting, for South Carolina was overrun by the British, and young as he was he joined an expedition to drive them out.

At the close of the Revolutionary War, Jackson found himself alone in the world, for his two brothers had been killed and his mother had died as a result of the hardships she endured nursing American prisoners. After trying several occupations, Jackson studied law and learned enough to be admitted to the bar in 1787. For the position of prosecuting attorney in Nashville, which he accepted in 1789, he had precisely the characteristics needed. Courage was the chief requisite, for offenders often came to court supported by bands of their friends. Jackson possessed plenty of both moral and physical courage, and though impatient of restraint himself, he was quite as determined to make other men obey the law, a resolution which won for him the esteem of the law-abiding and the respect of evil-doers.

These qualities soon gained him recognition as spokesman of the West. He was member of Congress at 29, United States senator at 30, judge of the Supreme Court of Tennessee at 31, and major-general of militia on a dangerous frontier at 35.

contained in the Easy Reference Fact-Index at the end of this work

When Jackson entered Congress in 1796 the aristocratic governing class of the East looked with disgust upon this grave backwoodsman. One noted his uncouth dress and manner, his hair done up in a queue with an eel-skin; and Jefferson declared that his "violent passions choked his utterance" whenever he attempted to make a speech. Jackson evidently cared no more for the people he met at the national capital than they did for him, or perhaps he recognized his unfitness for a position among the dignified members of the Senate. At any rate he resigned in 1799, to return to Tennessee as a justice of the Supreme Court of the state.

Enter the Hero on Horseback

When Jackson next appeared in national politics he came as a military hero and the popular idol of the West. He had offered his services at the beginning of the War of 1812, but his two great victories in that conflict were irregular. The one on March 27, 1814, over the Creek Indians at Horseshoe Bend, Ala., was really a campaign of the states of Tennessee, Georgia, Mississippi, and Alabama, and not a part of the Federal operations. His greater victory at New Orleans, on Jan. 8, 1815, was gained after the treaty of peace was signed, but before it was known in America. His victory over the Indians had important results, for it broke the power of the redmen in the Southwest, and gave America a chance to concentrate her forces for the conflict with England. The victory at New Orleans did not have any bearing on the results of the war, but it was regarded by the people of the country, especially of the West, as having removed the danger of foreign control of the Mississippi River. In some sections of the country "Jackson Day," January 8, was long a Democratic festival.

Jackson always went straight for what he wanted. This characteristic sometimes involved him in difficulties, as it did in 1817. He had been ordered to the Florida frontier where the Indians were massacring the American settlers. Jackson, with many others, felt that the redmen were incited to these raids by the British and the Spanish. As a frontiersman he hated the Indians. Because of the ill-treatment he had received while a prisoner during the Revolutionary War, he hated the British; and as a Westerner he disliked the Spanish because they frequently closed the Mississippi River to American commerce. His hostility to these three peoples made the expedition to Florida an especially agreeable one to Jackson. Without waiting at the frontier for further orders, he crossed into Spanish territory, captured Saint Marks, and there hanged as spies two British subjects. This high-handed proceeding naturally raised delicate diplomatic questions between America and England and Spain. It led to a proposal from Calhoun, then secretary of war, that Jackson be censured for exceeding his orders. Nothing came of the proposal, except the life-long hostility of Jackson to Calhoun.

However much his actions may have embarrassed the government at Washington, they only served to make Jackson more popular in the West. Nor was this popularity lessened by his arrogant conduct while governor of Florida, after that territory had been purchased in 1819 from Spain. Instead it increased until, in 1824, he became one of the five candidates for the presidency. Though he received more of the electoral votes than any of the other candidates, he did not have a majority and the choice therefore went to the House of Representatives. In that body Clay's followers, realizing that their leader could not be elected, gave their votes to John Quincy Adams, who in consequence was elected. When Adams appointed Clay as his Secretary of State, Jackson was convinced that he had been cheated out of the presidency by a "corrupt bargain" between his two rivals. Many agreed with Jackson, although there was no ground for this charge; and the feeling that he had not been treated fairly, together with the dislike many felt for the cold uprightness of Adams, and their admiration for Jackson, gave him the election in 1828 as a Democrat by an electoral vote of 176, to 83 cast for Adams as a "National Republican" (Whig). It should not be forgotten, also, that Jackson's campaign was very skilfully managed by his friend and adviser, William B. Lewis. John C. Calhoun of South Carolina was reëlected vice-president but soon resigned owing to strained relations with Jackson.

The Spokesman of the Common People

The common people felt that at last they had an executive who was one of them, as was shown by the appearance of the crowds at Washington on inauguration day. Half the men wore their trousers tucked into their boot-legs and not a few carried pistols openly in their belts. The contrast between "Jeffersonian democracy" and "Jacksonian democracy" is indicated by the contrast between Jefferson's mansion at Monticello, and the backwoods log cabin in which Jackson spent his youth.

Jackson regarded himself as a spokesman for the common people, in whom he had absolute confidence. This belief he expressed in the phrase "Let the people rule," and in order to let them "rule" he removed from office in the first year of his administration about 2,000 office-holders to make room for his friends. This was an application of the hurtful "spoils system," with its cry, "To the victor belong the spoils," which flourished and corrupted American politics for more than half a century and which civil service laws have not yet altogether removed.

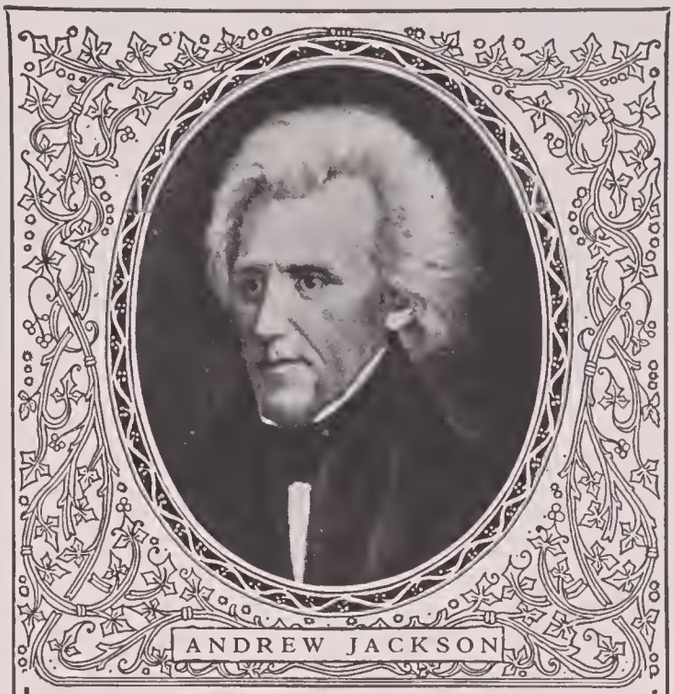
This same hatred for anything resembling class privilege led Jackson to attack the Bank of the United States. He vetoed the bill granting the bank a new charter, and declared its control of the country's money was a menace to business and to democratic government. The election of 1832 was fought on the issue of "Jackson or the Bank," and Jackson won by a large popular vote (219 electoral votes to 49 for Henry Clay). Martin Van Buren of New York was chosen vice-president.

Jackson took his reelection as a verdict against the Bank from the supreme authority of the country—the people; and although the Bank's charter still had three years to run he directed that the government funds should be taken from it and deposited in "pet" state banks. The "dying monster," as Jackson called the Bank, fought savagely, but in the end it was defeated and was compelled to transform itself into a state bank of Pennsylvania.

The banks which had the use of the government funds began to issue paper money in enormous quantities, and the wildest speculation followed. Then suddenly Jackson, in 1836, issued his famous "specie circular" declaring that the government would accept only gold or silver in payment for public lands. At about the same time he called upon these banks to give up the money which had been deposited with them, so that he might lend it to the states. The result was a disastrous panic, but since it came upon the country just after Jackson left office, the blame for it fell upon his successor.

Although Jackson was such an opponent of all forms of control by the "few," he was one of the most despotic presidents the country has ever had. He usually ignored his cabinet officers, and sought advice from a little group of friends which became known as the "Kitchen Cabinet." He enlarged the power of the President in his relations with Congress by freely vetoing bills. His six predecessors taken together had vetoed nine bills. Jackson vetoed 12, besides using the "pocket veto" freely, by quietly letting bills die that reached him within two days of the end of a session.

He also increased the influence of the executive by the firm position he took in a conflict between South Carolina and the government of the United States. South Carolina objected to the tariff law of 1832, and issued an ordinance declaring that it should not be obeyed in that state. Jackson responded with a proclamation warning the South Carolinians of his determination to enforce the law—by the bayonet if necessary. He had earlier announced his unalterable opposition to what is called "nullification" and "secession" by a famous toast which he gave at a banquet attended by South Carolinians: "Our Federal Union—it must be preserved." Jackson did, however, recommend to Congress that the tariff be revised, and the bill for this was passed on the same day that a "force bill" passed giving the President troops to compel obedience from South Carolina. The debate between Webster and Hayne, three years before, over the right of the states to thus set aside a law of the national government was one of the most brilliant ever heard in Congress. Immediately after the passage of the two laws South Carolina repealed her nullification ordinance.


ANDREW JACKSON

JACKSON'S ADMINISTRATIONS
1829–1837

"Spoils" appointments to office (1829).
Webster-Hayne Debate (1830).
Garrison publishes 'The Liberator' (1831).
McCormick invents reaper (1831).
South Carolina threatens secession over tariff (1832).
Jackson's war on the Bank (1832–37).
Texas secedes from Mexico (1835).
War with Seminole Indians (1835–42).
Arkansas and Michigan admitted (1836, 1837).
Financial Panic of 1837.

Quite contrary to Jackson's firm stand in this question was his action when Georgia disregarded the authority of the United States. Georgia had passed a law regarding certain lands which by treaties had been given to the Indians. The Supreme Court of the United States declared that this state law should not be enforced. When a man was imprisoned by Georgia authorities for disregarding the state law, President Jackson refused to use the executive power to uphold the decision of the Supreme Court. Instead he merely remarked: "John Marshall has made the decision; now let him enforce it."

One reason for Jackson's changed attitude was that he hated the Indians and was glad to see them lose their lands. Another was that he was largely guided by his feelings, and he disliked Chief Justice Marshall, the author of the decision in the Georgia affair, as much as he had hated Senator Calhoun, the defender of South Carolina.

When Jackson retired from office he had the satisfaction of seeing his chief points carried: the tariff question was regulated on his principles, the Bank of the United States was closing up its affairs, nullification was laid low, and the Indians in Georgia had been pacified. His satisfaction was increased by the fact that Van Buren, who had been rejected by the

Senate as minister to England, was his successor; and that Roger B. Taney, whom the Senate had twice rejected for lesser offices, was the Chief Justice who administered the oath of office.

During the eight years which followed Jackson's retirement, the hard times which came upon the country in 1837 hurt him financially and also disturbed his peace of mind. But they did not destroy his popularity. Admirers named their children for him and asked for his autograph; and so many wrote to request a lock of his hair that he kept the clippings whenever he had it cut. Neither Washington nor Jefferson enjoyed the popularity that "Old Hickory" did, nor have many presidents since his day possessed to such a degree the love and confidence of the majority of the people. He died at his estate, The Hermitage, near Nashville, Tenn., on June 8, 1845, and was buried in the garden.

JACKSON, THOMAS JONATHAN ("STONEWALL") (1824–1863). In the whole history of the War of Secession no figure stands out with more picturesque vividness than that of "Stonewall" Jackson. His earnestness of purpose and his religious determination to do the right as he saw the right, combined with his great military genius, made him a man admired alike by friend and foe.

His strength of will was probably the result of his sturdy Scotch-Irish descent, and of his fight with adverse circumstances. Left a penniless orphan at an early age, he learned to depend upon himself and secured an education by his own efforts. After attending a small country school in Virginia, he decided to go to West Point. He set out for Washington, traveling part of the way on foot, and when he arrived in the capital, he presented himself before the Secretary of War, and asked for an appointment to the Military Academy. The secretary was so impressed by the boy's determination that he immediately gave him the appointment. After his graduation in 1846 he served in the Mexican War and won such distinction that in seven months he was promoted from the rank of second lieutenant to that of major. After the close of that war he became a teacher in the Virginia Military Academy, and though he was not a success in the classroom, he left an indelible impress upon the negroes of the community, for whom he established a Sunday School and to whom he was unfailingly kind.

In 1861, when the quarrel between the North and the South came to a crisis, he threw in his fortunes with his own people. He wished to see the Union preserved, but he did not believe that the North should force the South to remain a party to a compact which had become hateful. At the battle of Bull Run, when some of the Confederates were thrown into confusion, one of their generals called to the men: "There stands Jackson like a stone wall; rally behind the Virginians." The cry was taken up by the soldiers, and "Stonewall" Jackson was the name by which he was known ever after that.

In the War of Secession Jackson's career more than fulfilled the promise given by his exploits in the Mexican War. Though he stood "like a stone wall" in battle his fame as a general rests chiefly on the rapidity with which he could march his men from one point to another, and strike the enemy where they were least expecting it. So rapid were his movements that his men became known as "Jackson's foot cavalry." In 1862 he conducted a famous campaign in the Shenandoah Valley in which he completely mystified the Federal commanders. At the battles of Fredericksburg and Antietam, by his sudden and unexpected appearance, he rendered valuable aid to General Lee. In May 1863, after winning the battle of Chancellorsville, he and his escort were mistaken in the dusk by his own outposts for a detachment of Federal cavalry. They were fired upon and Jackson fell mortally wounded. The loss of this brilliant general more than offset the Confederate gain in their victory.

While we remember Jackson as a great general, it is especially as an earnest and upright man that we admire him. On the march he always carried with him his Bible and Napoleon's 'Maxims of War'. To the study of the latter he owed his success as a general; to the study of the former his greatness as a man. He interpreted literally the injunction to pray without ceasing, and even on the battlefield his lips were often seen moving in prayer. The attitude of his men towards this characteristic of his is best illustrated by a poem written by one of his soldiers who lost his life in the Shenandoah Valley:

> Silence! Ground arms! Kneel all! Caps off!
> Old Blue-Light's goin' to pray.
> Strangle the fool that dares to scoff!
> Attention! It's his way,
> Appealing from his native sod,
> In *forma pauperis* to God:
> "Lay bare Thine arm; stretch forth Thy rod.
> Amen!" That's Stonewall's way.

JACKSONVILLE, FLA. The principal gateway to the state, Jacksonville is the city of Florida's present, as St. Augustine is of its past. A thriving, bustling manufacturing town it is, with scarcely a relic of the historic past except in its name, which preserves the memory of Andrew Jackson, first territorial governor of Florida. Above all, it is the state's chief distributing center and focus of traffic.

The situation of Jacksonville near the mouth of the St. Johns River, the largest navigable stream in the state, naturally made it the chief transportation terminal before the railroads were extended south beyond it, and as the principal railway center today it still receives by far the greater portion of the state's travel, imports, and exports. Its excellent harbor, moreover, has never been visited by a storm serious enough to injure shipping, and, now that the sandbars at the mouth of the St. Johns have been removed, vessels drawing up to 30 feet can enter and dock. These advantages, together with extensive dry-dock facilities, make it an entry port for thou-

sands of vessels a year. More than 50 ocean-going vessels can be berthed at a time.

Its manufactures are chiefly lumber and timber products, but it has also three large ship-building plants, making both steel and wooden ships; besides many minor industries. In one of its suburbs is the largest ostrich farm in the United States, and the only one east of California. Population, about 92,000.

JACOBINS. This famous organization of French Revolution days was started modestly at Versailles in 1789 by the country members from Brittany who were attending the National Assembly. They were known as the Breton Club, and were at first essentially conservative, with a duke for a president. By and by other delegates not from Brittany were admitted; then men not in the Assembly became members. It was known now as the Friends of the Constitution. When the king and Assembly moved to Paris the club took up its quarters in an old disused monastery of the Jacobin monks and received its popular name from this meeting place. It organized a network of branches through the country to assist in preserving and defending the work of the Revolution. It was the chief nation-wide organized body in that period of turmoil and as such it helped to form public opinion. Gradually it became more and more powerful. The transfer to Paris had opened the membership and galleries to the radical groups in Paris. The more conservative members drew away from it or were expelled and formed other clubs. The flight of the king turned its whole influence against monarchy and in favor of a republic. The leadership passed to men like Robespierre and Danton until finally the word "Jacobin" came to mean a person of extreme revolutionary sentiments, much as the term "Bolshevik" is applied in our own day.

The Jacobin leaders at first opposed war with surrounding countries, then threw themselves into its prosecution and the propaganda that went with it. They confidently expected to catch the king and queen in intrigues with the Austrians and Prussians, and succeeded. In the fall of 1792 they engaged with the Girondists in a bitter struggle over the fate of the king, and the execution of Louis XVI was the result of the shrewder political game of the Jacobins. Their meetings now became, until the fall of Robespierre (July, 1794), more important than the discussions of the Convention itself. The club was closed in November 1794, but its membership both within and without Paris was influential in later events.

THE BIGGEST OF AMERICAN CATS



Suppose you should meet a spotted cat like this, measuring four feet from his nose to the root of his tail—would you stop to remember that he is a Jaguar, that he is an expert at catching fresh water turtles, that he lives all over South America, and other interesting things that are told in the article on this page?

JAGUAR (*jăg'wär*). This formidable beast of prey is the largest member of the cat family found on the American continent. The average length is about four feet from nose to the root of the tail. It is the tiger of the New World and the third most powerful of the entire cat tribe. The head is noticeably large, the legs massive. There is much variation in its color, but in general it is yellowish brown with black spots like the leopard. The spots, however, are larger and more angular. It inhabits all South America, except Patagonia, and is occasionally found in North America as far as the Red River of Louisiana and the Medina River of Texas. It abounds in the forests, especially along the Amazon, and is the dreaded foe of man and quadrupeds. Its terrific roars at night are enough to shake the stoutest nerves. It hunts both by pursuit and by pouncing on its victims from trees, and is expert at catching fresh-water turtles. Scientific name, *Felis onca*.

JAMAICA. With her dreamy palm-fringed coves and cloud-capped mountains rising out of the turquoise waters of the Caribbean Sea, Jamaica today, as in the days when Columbus exclaimed over its beauty, is a fairy garden blooming in perpetual summer.

But Jamaica (whose Indian name *Xaymaca* means "island of fountains") is not merely a tourist wonderland of fields flaming with orchids, iris, passion-flowers, poppies, and wild pansies; of sparkling streams and jungle-lands of palms, bamboos, and giant ferns, where cuckoos, humming-birds, parrots, and many-colored butterflies endlessly flutter. It is a land of rich commercial resources as well, with its luxuriant lowland plantations, its gleaming gold and emerald fruit trees; and its weird dusky mountain forests of moss-hung logwood, satinwood, mahogany, rosewood, and ebony. Trading for the most part with the United States, Jamaica exports chiefly bananas, coconuts, logwood (used for dyeing), logwood extract, sugar, coffee, rum, cocoa, allspice or Jamaica pepper (the berry of an evergreen tree), and her famous Jamaica ginger.

Although this largest and most important of the British West Indies is singularly free from venomous snakes and dangerous animals (for only a few wild pigs and an occasional alligator are found here), it has suffered severely from earthquakes and hurricanes. In 1907 an earthquake largely destroyed Kingston, its capital, and killed over 600 people, and a disastrous cyclone ravaged the western part of the island in 1912.

Jamaica lies about 90 miles south of Cuba on the main ship route between the Panama Canal, and Europe and the Atlantic states. The island, 144 miles long, 40 miles wide, and with an area of 4,200 square miles (nearly as large as Connecticut), has many good harbors, of which Port Royal, the chief commercial port, is the best. It was discovered by Columbus on his second voyage, in 1494, and 15 years later it was settled by the Spaniards. In 1655 it was conquered by an expedition sent out by Cromwell, and has since become an English colony.

In the early days the island was a favorite haunt of pirates. During the 18th century more than 600,000 negroes were imported to work on the plantations, and many terrible insurrections took place. Slavery was abolished in 1834. The inhabitants now are about 77 per cent negroes, 20 per cent half-castes, only about 2 per cent whites, and the rest East Indian coolies, imported as plantation laborers, and Chinese. The government is in the hands of a governor appointed from England, a council, and an elective assembly. Population, more than 900,000.

TYPICAL PRODUCTS OF JAMAICA



The bananas, the ultra-black negresses, and the broad-brimmed straw hats are all typical of this richly endowed British colony. The picture shows a typical "fruit-store"—a little space screened off in the market place, where the "merchant" sits and sells her wares.

JAMES, KINGS OF ENGLAND. Only two rulers of England have borne the name of James. The hatred which was felt for the second of these, because of his attempt to rule despotically and restore the Catholic religion, is probably one reason why the name has fallen into disuse.

JAMES I, who was king of England from 1603 to 1625, was already King James VI of Scotland when he came to the English throne as the first of the Stuart line (*see* Stuart). He was the son of the unfortunate Mary Queen of Scots, and of her second husband, the feeble James Stuart, Lord Darnley (*see* Mary Stuart, Queen of Scots). Born in Edinburgh Castle in 1566, he became king of Scotland the following year when his mother was forced to abdicate. During his minority he was a prize to be fought for by warring lords who claimed the regency, and by contending French and English factions. In 1582 he was seized by the Earl of Gowrie and the Protestant party and held captive for a year. Upon his escape he began to govern in reality.

As a boy the young king was sickly, and he never outgrew a weakness of the legs which made it impossible for him to stand without support until he was seven. He became a bold rider, although for many years he found it necessary to be tied in the saddle. He was thoroughly educated, especially in theology, and although the son of a Catholic mother remained through life a staunch Protestant. But his large head and rickety legs gave him an ungainly appearance, and he had little of the dignity that befits a king. A foreigner at his court in Scotland once wrote: "He speaks, eats, dresses, and plays a boor."

When James succeeded to the English throne in 1603, on the death of Queen Elizabeth — his cousin "twice removed" —he was a man of 37 and prided himself on what he called his "kingcraft." In reality he so lacked political discretion that a French statesman once characterized him as "the wisest fool in Christendom."

Nearly everything that James did displeased some part of the English people. He aroused their jealousy by a vain attempt to bring about a closer union of his two kingdoms of England and Scotland. He alienated both the Puritans and the Catholics, each of whom had expected concessions from him (*see* Puritans). Some of the Catholics engaged in the Gunpowder Plot to blow up Parliament and the king and bring in a Catholic ruler (*see* Fawkes, Guy). Only one of his acts pleased the Puritans, namely the new translation of the Bible which forms the "King James Version" now in common use.

James I also quarreled with Parliament over taxation and political matters. He believed in the "divine right of kings," that is, that they receive their powers from God, and are responsible to Him alone, and not to their subjects. He took the position that Parliament owed all its powers and privileges to the graciousness of the king; while Parliament claimed that these were the "birthright and inheritance of the subjects of England." He quarreled with it, too, over foreign affairs. He wished to ally with the Catholic country of Spain and to marry his son Charles to a Spanish princess. Parliament wanted

to fight Spain at sea, and thus aid the German Protestants in the Thirty Years' War (*see* Thirty Years' War). Not until James' plans for a Spanish alliance failed and he decided to make war upon that country, did he and his Parliament agree. The year after the war was begun James I died, leaving his son Charles I the difficult problems that he himself had been unable to solve.

The Narrow and Stubborn James II

JAMES II, who reigned from 1685 to 1689, was a grandson of James I. His ideas of the "divine right of kings" were the same as those of his grandfather and his father, Charles I. Fortified by the example of Louis XIV in France, he attempted obstinately to carry out his ideas in spite of the fact that his father, Charles I, had been beheaded by Parliament. It has been said of James II that he alienated "not only the classes which had fought *against* his father, but also those that had fought *for* his father."

When James II came to the throne the people welcomed him, and fought for him against a rebellion led by the Duke of Monmouth. But the cruelty shown to the followers of Monmouth at their trial—called the "Bloody Assizes" because of their vindictiveness—turned many against the king.

Then James angered the nation by trying to restore Catholicism as the religion of England. When he came to the throne he had promised to maintain the church "as by law established." The people took this to mean the Established Church of England (Episcopal), and rejoiced that they had "the word of a king, and of a king who was no worse than his word." But they soon learned that James put a different meaning on his word, for he did not consider the Reformation statutes to be valid. He set aside or "dispensed" with the laws against Catholics and Dissenters. Seven bishops protested against reading one of his dispensing proclamations, and James sent them to trial. He appointed many Catholics to office and even named some as bishops in the Church of England. If some of his acts indicated a toleration that was in advance of his age they were merely to aid his fellow Catholics.

How a Baby Brought on a Revolution

At first there was no organized opposition. Waiting seemed wiser, for James was 52 years old when he came to the throne, and his only children Mary and Anne, by his first wife, were both Protestants. But in 1688 a son was born to him by his second wife, who would be the heir to the throne and would be educated as a Catholic and so would prove another Catholic king. Protestant nobles unjustly claimed that the child was not really the son of James and the queen, but was fraudulently smuggled into the palace. They therefore invited James' daughter Mary and her husband, William of Orange, to come from Holland and take the throne of England. When William landed practically everyone, even his daughter Anne, deserted James, and he fled to the continent. This was the "glorious revolution of 1688."

James fled to France, where he was cordially received by Louis XIV, who had been furnishing him money to carry on his fight for absolute power and Catholicism. The French king now gave James a pension and support in trying to recover his throne. But James was defeated in Ireland at the Battle of the Boyne (July 1, 1690) and the French fleet was crushed at La Hogue in 1692. After that James gave up actively trying to regain the throne and spent the remainder of his life quietly in France, where he died in 1701. (*See also* Pretender; William, Kings of England.)

JAMESTOWN, VA. Today only an old church tower, a few tombstones, the foundations of old buildings burned down years ago, and a few modern houses mark the site of Jamestown, the first permanent settlement made by the English in America.

It was in May, 1607, that a little vessel bearing 104 colonists, sent out by what was known as the London Company, appeared in Chesapeake Bay, seeking a place to land. The leaders chose a site on the banks of a pleasant stream which they called the "James River" in honor of King James I. It was chosen some 30 miles up stream to avoid Spanish attacks from the sea. Unfortunately the site was low and unhealthful, and according to one of the settlers the "men were destroyed by cruel diseases." When the first supply ship arrived a few months later there were only 38 left alive.

Some of the trouble of the colonists was due to the method of managing the "plantation of Jamestown." The products of the settlers' labor went into a common stock. With no chance to acquire individual property, sick and discouraged, many of the men refused to work. The colony would have failed entirely had it not been for the efforts of the burly, bragging, but efficient Captain John Smith. The winter of 1609, following his return to England, was known as the "starving time." In the spring the survivors were actually on board ship to return to England, when a fleet brought supplies and put an end to the colonists' sufferings.

The town was three times burned—in the winter of 1608, again during Bacon's Rebellion in 1676, and again some 20 years later. Owing to the unhealthfulness of the site, the town was then abandoned, and the capital of the colony moved to Williamsburg. (*See* Smith, Captain John; Virginia.)

JANUARY. More than 250 years before the Christian era, January was the first month of the year in the Roman calendar. It was named from Janus, the "two-faced" god who in the Roman mythology presided over the beginning of things, and was the doorkeeper ("janitor") of heaven. The so-called temple of Janus, which was simply a gateway in the Roman Forum, was open in war and closed in peace.

During the Middle Ages the year began at various dates in different times and places. It was not until 1751 that January was restored to its place as first month by act of Parliament. (*See* Calendar.)

The LAND of the RISING SUN

Extent.—Length of island chain, north to south, about 2,800 miles. Area of Empire, 260,738 square miles—including Japan proper (four main islands of Honshu, Kyushu, Shikoku, Hokushu), Japanese Sakhalin, Formosa, Kuril and Nansei groups, and Korea on the mainland. As mandates under the League of Nations, Japan also administers the Marshall, Caroline, Pelew, and Ladrone islands (except Guam), and Kiaochow (China); leased territory, Kwangtung; together, 1,670 square miles. Total population, about 77,006,000.

Physical Features.—About 3,000 islands, largely of volcanic formation, with numerous high mountain ranges and more than 200 volcanic peaks, about 50 of which are active. Korea, generally hilly, with several mountain groups. Highest point in Empire, Mt. Morrison, on Formosa (13,020 feet); on the main island, Fujiyama, the "sacred" mountain (about 13,000 feet). Climate varies from tropical in the south to extreme winter cold in north.

Products.—Rice and other cereals, raw silk, tobacco, tea; coal, copper, petroleum, silk, cotton, and woolen goods, steel, paper, matches, toys, earthenware, lacquered ware, matting, etc.

Principal Cities.—Tokyo (capital, 2,175,000), Osaka (1,255,000), Kobe (610,000), Kyoto (592,000), Nagoya (430,000), Yokohama (425,000), Nagasaki (177,000), Hiroshima (165,000).



Japanese people are children of Nature and spend much of their lives in the open air. All the cities have beautiful parks and this is a scene in one of them. What could excel in dreamlike beauty this picture with its gnarled cedar, so characteristic of Japan, and the pretty Japanese maiden with her parasol mirrored on the glassy surface of the water?

JAPAN. Of all the remarkable changes that took place in the 19th century, perhaps none was more notable and unexpected than the transformation of Japan. In 1850 it was an obscure Asiatic country, which for 200 years had shut itself up tightly from the rest of the world. Foreigners were not allowed to enter the kingdom, and subjects were forbidden to leave under penalty of death. Then suddenly came the awakening. In July 1853 Commodore Matthew C. Perry appeared off the coast with a squadron of ships of the United States navy, sent by President Fillmore to induce Japan to enter into trade relations with the nations of the West. After some time spent in negotiations, a treaty of friendship was signed (in February 1854) by which Japan agreed to open certain ports to American vessels and receive an American consul. European countries, which for some time had been seeking to open up Japan, now followed America's lead. After a few years of hesitation Japan unlocked the doors of its Empire, and began rapidly to adopt western civilization. In 1868 a political revolution took place by which the Shogun (a sort of viceroy) who for 250 years had borne the actual rule in Japan, was deposed and the power of the Mikado, or Emperor, was restored; and this was followed three years later by the total abolition of Japanese feudalism, and adoption of western civilization.

In less than two generations Japan has evolved from a feudal nation hermetically closed to one of the great manufacturing countries of the world. Its ships are now found in every port, and carry a large part of the traffic of the Pacific Ocean. Japanese scholars have become proficient in modern science and engineering and a great modern army and navy have been created. These have demonstrated their

strength in successful wars against China, Russia, and Germany, have doubled the territory of the Empire, and have won for it recognition as one of the great powers of the world.

As the island kingdom of England is the gateway to Europe, so Japan, the island kingdom of the East, is the gateway to Asia. For a distance of almost 3,000 miles its islands fringe the edge of the continent in three great festoons. The most northern arc consists of the Kuril Islands—cold, barren, and inhabited chiefly by fishermen. In the center is the main group, Japan proper, which consists of four large islands—the greatest, Honshu, being about the size of Great Britain. In the south the long chain of the Nansei (Riukiu) Islands forms an almost continuous link with Formosa, which is the most southern part of the Empire, won as the spoils of the China-Japan War of 1894. In addition, Japan shares with Russia the large island of Sakhalin in the north, and less extensive outposts on the Asiatic mainland. Korea, acquired in the Russian War of 1904, is now a part of her Empire, and she has a dominating influence in Chinese Manchuria and part of Mongolia. Altogether the Japanese possessions cover a greater area than all the New England and Middle Atlantic states in America, and contain more than half as many people as the whole United States. If swung over to the Atlantic coast, without a change of latitude, the long chain of islands would extend all the way from Labrador to Cuba.

AN AVENUE OF TREES IN NIKKO



High up in the mountains of Japan lies the celebrated religious center of Nikko. Such highways as this, bordered by stately trees, wind up and down the hills between the many ancient sepulchers and sanctuaries.

Nature in Japan is beautiful everywhere. The narrow islands are crowded with mountains of more than average height, whose soft contours, caused by erosion and volcanic force, are responsible for a landscape that is as unusual as it is lovely. The beauty of the gnarled and twisted old pines, picturesque maples, and great masses of wild flowers in spring and summer helps to explain the artistic temperament which even the most ignorant Japanese possesses. Probably in no other part of the world are flowers so greatly appreciated as in Japan. The poorest householder always has a garden, and flowers enter largely into public festivals. When the wild cherry trees are in blossom is the special feast of flowers; but plum blossoms, the wistaria, iris, and chrysanthemum are all celebrated in their seasons.

By far the most famous and lovely of Japan's wonders is, of course, Mount Fujiyama, the sacred mountain of Japan; formerly a volcano, it has been quiescent for more than two centuries. It stands alone in a plain about 70 miles from Tokyo. From earliest ages Japanese poets and painters have made it their theme, and many thousand pilgrims ascend each year the shrine-bordered paths which lead to its summit.

Few scenes from which water is absent find much favor in Japanese eyes. There are many charming waterfalls and lakes in the mountain districts, and streams and bridges are everywhere found. The island-studded Inland Sea south of the main island is world renowned for its charming scenes; as are also the Pine Islands in northeastern Japan—800 of all shapes and sizes—each with its crown of twisted pines rising out of the blue waters. Japan's numerous volcanoes furnish hundreds of hot mineral springs, visited continually by Japanese pilgrims.

Both mountains and streams, however, have their tragic side. Among Japan's mountain ranges are more than 200 volcanic cones, of which no fewer than 50 are known to be active. Japan has an average of four earthquakes a day, not counting the minor vibrations felt only by delicate instruments; and it is said that every Japanese expects to experience at least one serious earthquake during his lifetime. And even greater injuries on life and property are inflicted by the floods, caused by swollen mountain

streams and tidal waves. Occasionally, too, the typhoons or hurricanes do considerable damage.

Japan has a coast line all out of proportion to its area, and good harbors are to be found nearly everywhere, but especially in the east. Here, consequently, are found most of the large cities—Tokyo, the capital and largest city; and on the same bay its port, Yokohama, which handles more than one-half of Japan's foreign trade. Farther south is Osaka, the nation's industrial center and second largest city; and Kobe, its port, which is to Osaka what Yokohama is to Tokyo. Near Osaka is Kyoto, which for more than 1,000 years was the capital of Japan. It is the Japanese "Mecca," the center of the Buddhist faith, and its beautiful temples are visited by many pilgrims.

The remarkable extent of Japan from north to south affords every variety of climate and a resulting variety of crops, much of the country producing easily two harvests a year. Despite the great mountain ranges, which permit only about one-eighth of the land to be cultivated, agriculture has always been Japan's most important industry. More than half of the arable land is in rice, which forms the staple food of the people. Everywhere in the lowlands are found the little square rice-fields, surrounding small villages of brown-thatched cottages of wood and paper, where the farmers live. The people still cling to their ancient methods of cultivation, doing all the work by hand or with crude implements; and women and children, as well as men, are seen in the fields. Labor is cheap and the great and increasing population of Japan necessitates an intensive system of agriculture, so that even the steep hillsides are terraced fields.

As the country slopes upwards from the alluvial plains, the rice-fields disappear. Wheat and barley take their place, or sweet potatoes, "daikon" (a large radish), and eggplant. These form the food of most of the agricultural class; rice among them is considered a great delicacy, for it is usually sold to the cities or to foreign countries. Much rice of cheaper quality is also imported from other Asiatic countries. Tea is the national drink of the people, and the tea plant is widely cultivated, especially near Kyoto. Tobacco is also raised extensively.

A Japanese farm seems strangely quiet to foreigners, because of its lack of animals. The Buddhist religion forbids the use of animal food, and the Japanese therefore resort to the sea for a substitute. Japan is one of the greatest fishing countries in the world, with almost 1,000,000 people engaged in this work.

THE LAND OF THE RISING SUN



Here you see how Japan and its many islands span nearly the entire seacoast of China, together with a large portion of Siberia. Korea, Port Arthur, and Kiaochow are Japanese footholds on the mainland.

Since the average farm of each family is only about three acres, it is only by double crops and side industries that the Japanese peasant can hope to make a living. Various handicrafts in straw and wood are carried on by the farmer and his family, but the chief home industry is silk-worm culture and silk production. Rows of dwarf mulberry trees are often seen forming a hedge around the upland fields, their leaves supplying food for the silk-worms. Piles of cocoons are set out in the sun to dry, and the cottages whir with the sound of silk winding. Silk is the chief export of Japan; it supplies about 40 per cent in the

"THE GREAT WHITE WAY" OF TOKYO



This street corresponds to Broadway in New York, for it is the theater street of Tokyo. The drama in Japan originated, as in Greece with the religious dance, a very solemn affair intended to impress upon the spectators such ideas as the inevitability of fate, and the fleeting character of life. But as the Japanese are a jolly people, they also have comedies. Plays of Western civilization are given, too, and you may be sure they have movies.

IN THE BUSINESS SECTION OF TOKYO



Many of the older streets of Tokyo are narrow and very crooked, but its principal thoroughfares are now fine and wide, like the one you see here. Although Tokyo is such a large place, you don't see any skyscrapers. Can you guess why? It's because they have too many earthquakes.

total consumption of the world against 45 per cent from China. About 60 per cent of the raw silk used in the United States comes from Japan.

Bamboo is widely raised, and, next to rice, plays the chief part in Japanese life. Not only is it used for building and furniture, but the tender young sprouts are cultivated for food. The forest trees of Japan cover nearly 60 per cent of the land, and many valuable products are obtained from them. Lacquer ware, one of Japan's most prized and characteristic products, is made from the sap of the lacquer tree; and much of the world's supply of camphor comes from Japan's camphor trees. The fibers of the paper mulberry are used for making "Japanese paper," and many other trees which grow in abundance furnish wood for match-making, for toy-making in which the Japanese excel, and for other purposes.

Recently in Japan there has been noticeable a remarkable drift of people to the cities. Today about 30 per cent of the population is urban, as compared to about 16 per cent a few years ago. Abundant water-power, cheap labor, and plenty of coal place Japan in a favorable position for competing industrially with western countries, and its manufacturing has developed remarkably in recent years. All over the land the old romantic life is passing away, and in its place is the whir and rush of modern industry. In all sorts of places, amid the low picturesque buildings of old Japan, you come upon the great factory compounds, surrounded by high board fences, where perhaps a thousand women live and work.

IN THE LAND OF VOLCANOES



Japan is a land of volcanoes. There is sacred Fujiyama, famous the world over for the beautiful simplicity of its form. Wrapped in its white shroud of snow, it is classed among the dead volcanoes, but you never can tell for certain whether a volcano is dead or not. In the larger picture we see a group of Japanese mountain climbers high up on the sides of Fujiyama, looking down upon the sea of clouds through which they have passed in their long ascent.

To the older articles of domestic manufacture—pottery, silk, toys, and objects of art—are now added many new products. All the Orient uses cotton for its clothing, and Japan has introduced the equipment of modern machinery needed to manufacture it. It imports raw cotton from India and America, and sells the completed cloth to China, Indo-China, India, and even Australia. Woolen manufactures are also growing apace, the chief center for both industries being in Osaka. Iron and steel industries are becoming increasingly important, and Japan competes today with England and the United States in shipbuilding. It also manufactures agricultural and other machinery, although most of its complicated machines are imported. Almost one-half of Japan's foreign trade is with the United States, which buys, among other things, vast quantities of silk in exchange for raw cotton and machinery.

MOUNTAIN CLIMBING DE LUXE IN JAPAN



Mountain climbing in Japan, as in the Alps, is a popular form of sport, but the Japanese ladies prefer to enjoy it at their ease. These ladies of the upper class are returning down a mountain slope borne in their palanquins by sturdy coolies. You can see how the walk has been improved in times past by planting shade trees.

It is a striking repetition of history that today the factory conditions of Japan are practically those that cursed western Europe 100 years ago. The swift development of a factory system on top of an old agricultural organization has produced a debasement of the working classes probably greater than anywhere else in the civilized world. Twelve-hour working days, child labor, unrestricted employment of women, lack of sanitation, and other abuses exist that destroy the body and soul, while Japan forges ahead toward industrial wealth. Girls are signed to work in many factories for three-year terms virtually amounting to slavery. A few factories, however, have voluntarily adopted Christian standards; and one has the unique distinction of producing the only silk bought by American importers without rigid inspection of its quality. Commercial morality also is generally lower than that of western countries, and notably lower than in China.

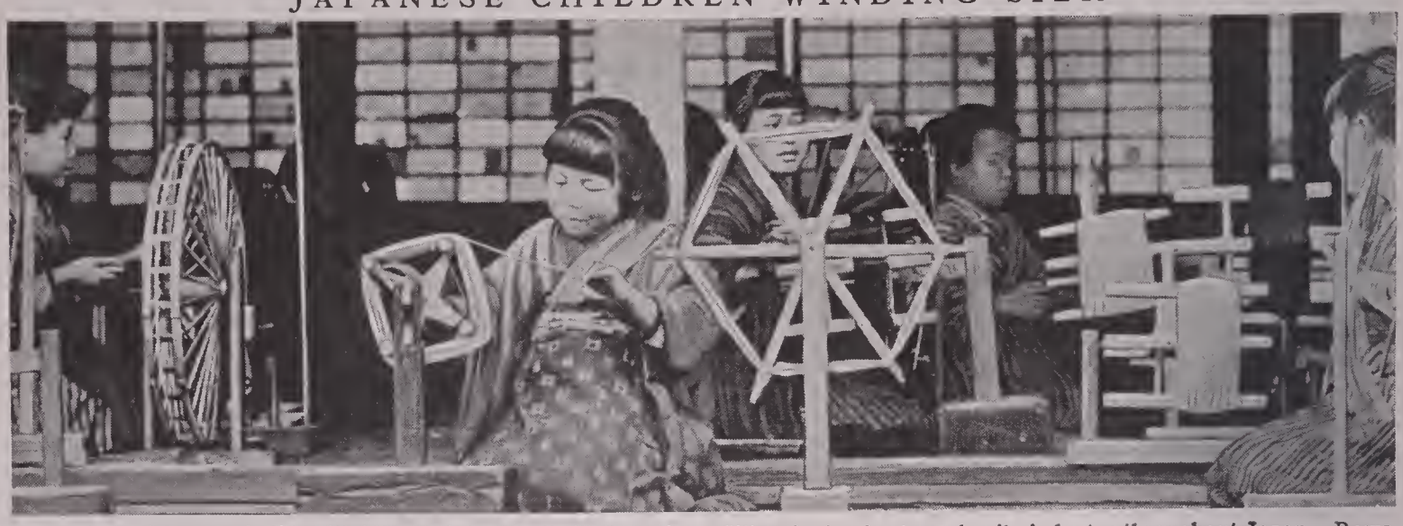
THE PRIESTS OF AN ANCIENT FAITH



These venerable gentlemen are priests of the most ancient religion of Japan, Shintoism. This religion, like our Bible, begins with an account of the creation and peopling of the World, but gives quite a different account of it. In addition to worshiping the powers of Nature, the Shintoists venerate the memories of countless Japanese heroes of ancient times. The Shinto Pantheon includes hundreds of deities — gods of trees, rocks, mountains, animals, family ancestors, earth, sea, fire, wind, and even such humble household appurtenances as the well, the bathroom, and the saucepan.

With the adoption of western machinery and methods the output of Japan's mines has enormously increased. The most valuable mineral product is coal, the richest fields being in Hokushu (Yezo) and Kyushu. With the acquisition of certain rights in Manchuria, Japan has added other rich deposits, so that its annual output is enormous. Copper is mined in every district in the country, and Japan ranks second to the United States in its production. Iron is also found, but in quantities wholly insufficient to

JAPANESE CHILDREN WINDING SILK



These little girls are winding silk in one of the small silk factories. Silk spinning is also a family industry throughout Japan. Rows of dwarf mulberry trees are often seen forming a hedge around the upland fields, their leaves supplying food for the silk worms, and the cottages whir with the sound of spinning wheels.

supply Japanese needs. This urgent demand for iron in part accounts for Japan's anxiety to gain a foothold in China, where there are rich mines of this all-important mineral. Petroleum fields exist in northern Japan, and are increasing in output under modern methods. Sulphur, which has been an important export for centuries, is produced in several volcanoes. Rich deposits of kaolin furnish clay for porcelain; and gold and silver are mined, though their production is decreasing.

That Japan has been able to take a place so quickly among the great commercial nations is owing to the national quickness of its people and their skill in adaptation. The government early sent forth large numbers of its young men to study abroad, and it has also sent out commissions to study trade conditions and factory systems all over the world. Modern educational methods, modern machinery and inventions have been adopted wholesale. "Adopt, adapt, adept" may be called the national trade and industrial motto since this awakening of interest in the outside world. Elementary education, modeled on European and American lines, is compulsory in Japan; and there are four imperial universities, besides many special, technical, and mission schools.

A BAKER MAKING COOKIES



The children of Japan are just like English-speaking children in many ways, and one of the resemblances, you can feel pretty sure, is that they also enjoy cookies. This is a Japanese baker at work with his cooky cutters.

The original religion of Japan is Shintoism, a combination of nature worship and ancestor worship. The chief deity, the sun-goddess Amaterasu, is looked upon as the ancestress of the imperial family, while numerous lesser gods are associated by tradition with mountains, streams, forests, etc. Buddhism ranks with Shintoism in importance, and among the upper classes Confucianism has many disciples. Christian missions have made considerable progress since the reopening of the land. Absolute religious freedom is accorded to all classes.

The royal ancestry of the Mikado, as the Japanese emperor is called, is perhaps the most ancient in the world. Japanese tradition fixes the foundation of the dynasty in the year 660 B.C., and 122 rulers of the imperial lines are counted since that time, 16 of whom were women. The most important event in early Japanese history was the adoption of Buddhism from Korea, which took place in the 6th century B.C. It was rapidly followed by the introduction of the Chinese civilization.

Although the emperor has always been the nominal ruler in Japan, his power was usurped in the 12th century by a military class whose leader was called the Shogun. The emperor came to be regarded as a divine but mystic ruler, who had no part in the practical work of government. A system developed closely resembling the feudalism of medieval Europe, in which the fighting barons and knights (*daimios* and *samurai*) were separated by a wide gulf from the commercial and agricultural classes. These caste lines are not yet all obliterated.

There still exists a great group, called the "eta" class, whose members are social outcasts and work only with dead bodies. The two chief religions, Shintoism and Buddhism, forbid such work for their

WORKERS IN HAMMERED METAL



The hammered metal work of the Japanese is one of the many attractive products of this artistic people. Here we see the craftsmen at work.

communicants; so the tanners, butchers, and some other workers of the country are ostracized, no matter how rich they may be.

Marco Polo, a Venetian who traveled extensively in China in the 13th century, first brought reports of Japan to Europe; and as "Cipango" it was one of the objects of Columbus' search. Three Portuguese sailors, blown out of their course from the coast of China, were the first Europeans actually to visit the islands (1542). This was before the age of Japanese seclusion, when foreigners were welcomed. The great Jesuit missionary, Father Francis Xavier, began his labors in Japan in 1549. For some years the Dutch and English had trading posts in Japan, and Japanese sailors traded with Mexico, the Philippines, China, and India. Then in 1614 the shogun ordered all foreign priests to be expelled and all their churches destroyed, on account of political plots. By relentless persecution, Christianity was stamped out, Japanese were forbidden to leave the island on penalty of decapitation, and until the middle of the 19th century Japan pursued its policy of isolation from the Western World.

The reign of a single emperor, the benevolent Mutsuhito (1867–1912), covers almost all of Japan's marvelous transformation since that time. Coming to the mikado's throne 13 years after Perry's treaty, he overthrew the shogun the next year (1868). In his famous Charter Oath he urged his subjects to seek knowledge and wisdom in all parts of the world so that they might help to place the empire upon a firm foundation. With this inspiration embassies of Japanese statesmen and students set forth to visit every civilized nation. Some of them had learned a little English through the medium of a Dutch-English grammar. They were garbed in the dress of old Japan, in kimonos with plaited overskirts of heavy silk, and they wore their hair in queues knotted on top of their heads. In appearance they were men of the old Japan, but their minds were alert for new ideas. Those who studied political systems were influenced by the German idea of government, and so drafted a constitution (proclaimed in 1889) on that pattern rather than according to the Anglo-Saxon idea of democracy. The German army and navy likewise seemed suitable models. France and Italy contributed conceptions of art and architecture, the United States and England their ideas of education and industry. The United States supplied also modern methods of agriculture and fruit-growing. One of its gifts was the first apple tree in all Japan, the parent of many fine orchards in the northern districts. With the beginning of constitutional government in 1890 the Era of Enlightenment had indeed begun to dawn.

GETTING THE SHOES MENDED



When there is any mending to be done on the wooden clogs or house sandals of a Japanese family, this is the way the shoemaker does the job. Notice he holds his work with his feet, just as the metal workers are doing in the picture above.

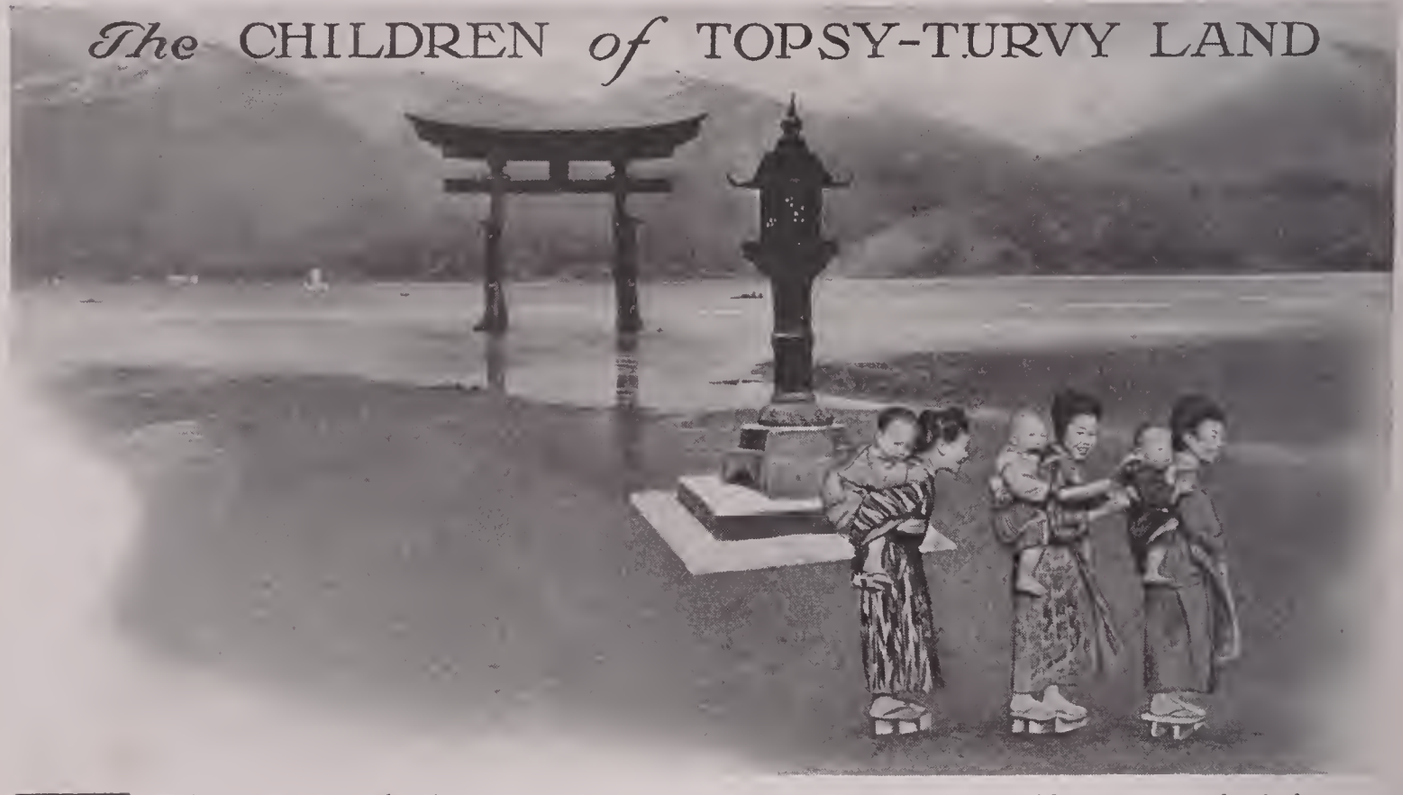
The changes that stand out as most important since that time relate to Japan's territorial expansion. In the war with China (1894–95) came the first test of Japan's new strength. The Japanese navy, built in the best shipyards of Europe, speedily sank the

Chinese fleet; and the Japanese army, drilled and equipped in modern fashion, overwhelmed China's antiquated forces. Russia, Germany, and France, however, stepped in and forced Japan to accept the island of Formosa as compensation, in place of Port Arthur and other places on the mainland which China had agreed to cede. Then Russia appropriated Port Arthur for herself, and Germany followed suit in Kiaochow. Japan accepted the situation and waited.

Nine years later Japan settled accounts with Russia in the great Russo-Japanese War (1904–05), in which the fleets and armies of the Giant of the North were thoroughly beaten by pigmy Japan. This victory brought to Japan Korea, half of Sakhalin, together with Russia's rights in Port Arthur, the Liao-tung peninsula, and Manchuria. (*See* Russo-Japanese War.)

When the World War began in 1914, Japan fulfilled her treaty alliance to Great Britain by at once attacking and capturing the strongly fortified German position in Kiaochow. It is interesting to note that the demand she made upon Germany at that time was in the same language that Germany had used 20 years before in forcing Japan to give up Port Arthur! At the close of the war Japan insisted upon receiving not merely Kiaochow and its stronghold Tsingtau, but also the whole of the German concessions in the province of Shantung. This was one of the grounds of China's intense bitterness for Japan, in spite of Japan's promise sometime to return Shantung to China. Japan also obtained, under mandates from the League of Nations, all the former island colonies of Germany in the Pacific north of the Equator. Japan has been suspected of plans for further extensions of her power—in China, in Siberia, and elsewhere. One result of this aggressive expansion of Japan is an increase in the tenseness of its relations with the United States, already disturbed by questions of immigration, and rights of education and landholding in California and other western states.

The CHILDREN *of* TOPSY-TURVY LAND



NOW if you would really like to know how the boys and girls in the Sunrise Kingdom live, what kind of clothes they wear, what they have to eat, what they study at school, and what kind of games they play, come for a little visit to the home of a Japanese boy and girl. The boy's name is Taro. That is a name that all Japanese boys like very much, for it is the name of the hero in one of their favorite stories. The little girl's name is Yuki. Her mother and grandmother call her Yuki Chan, and the servants say "O Yuki San," which means "the Honorable Miss Snow."

It is five o'clock in the morning. The rays of the bright sun have just begun to peep through the cracks in the shutters. *Br-r-r!* Off goes the alarm clock. The sleeping maid servants rub their eyes, make a hasty toilet, and begin sliding back the shutters. Now, a Japanese house is much like a great big dry-goods box. In the day time it is like a box with one side off, but at night it's like a box all tightly nailed up. During the day one side of the house is left entirely open to the sunlight and breeze, but the Japanese are not allowed to sleep with their windows open. The police will not let them, for they think that it would invite burglars to enter and rob!

When the shutters have been opened, every one in the family begins to stir. Really it is no use trying to sleep any longer, with the cook breaking up firewood in the kitchen, and the rickshaw man noisily sweeping up leaves in the garden.

Everyone in Taro's family has been sleeping on the floor, with thick quilts under and over them. The upper covering looks like a big padded overcoat, with its thick flopping sleeves. These sleeves are not to be worn on the arms. They are simply to help tuck in the quilt. Grandmother peeps in at Taro and Yuki and tells them to start getting dressed. Of course there is a grandmother in this house, because no Japanese home is without one. One cannot help wondering how it happens that there are grandmothers enough to go around. But there seems to be a Granny for every family, and Taro and Yuki would never know how to get along without theirs.

PLEASED? OF COURSE THEY'RE PLEASED!



If you were a Japanese girl coming home from school with your diploma hugged up to your kimono, to show to mother, you would have an expression on your face just like that. When modern schools were first started in Japan, the boys were the keenest to learn, but now the girls are just as eager as the boys. Besides "reading, 'riting, and 'rithmetic" the children are instructed in morals and etiquette, history, geography, drawing, singing, gymnastics, and manual work. Great stress is laid also upon domestic science.

After washing their faces in the shining brass bowls set out for them in the bathroom, the children put on their kimonos. Granny helps them. Just think of it, there isn't a button, or a hook and eye, or a pin used in fastening any of their clothes! Taro's kimono is made of dark striped material. The sleeves are rather short and the garment is held together by a black girdle. Taro doesn't need to worry for fear he will get holes in his stockings, for stockings are not worn in Japan. He covers his feet with white tabi, something like heavy socks that reach just above the ankle. Each tabi is made with a split toe so that the big toe may be slipped through the leather strap that holds on the straw sandal worn indoors and the wooden clog for street wear.

Yuki San's kimono is much gayer than her brother's. It has a pattern of flowers and birds, and is fastened with a bright red sash. Her sleeves reach to her knees. You'd never guess—unless you saw them turned inside out—what a wonderful substitute for pockets sleeves can make. Yuki San can carry a doll, a book, a half dozen paper handkerchiefs, a bag of sweets, and whatever else she pleases in her flowing sleeves, and no one will be the wiser.

If any one offered you what Taro and Yuki eat as a relish for breakfast, you would make a very wry face. Pickled plums, as sour as can be, and dipped in salt besides! Grandmother helps the children with their breakfast, because she doesn't want them to be late at school. They eat first a bowl of soup called "o miso." It is made of bean curd and the children think it very good. When they have finished their soup, Granny fills their rice bowls and each child has two helpings. Along with the rice they eat some vegetable greens and some pickled radish. They have eaten with chopsticks ever since they were babies, so it is no trick for them to pick up the very last kernels in the bottoms of their bowls. But it would be pretty hard for an American child to do this. When the rice bowls are empty, Granny fills them up with tea. Taro and Yuki hastily swallow this, and with polite "good-byes" to father and mother and many "thank-yous" to Granny, they are off for school.

If Taro and Yuki had lived 25 years ago, instead of today, they would have been obliged to sit on the floor throughout school hours. But nowadays every boy and girl through the whole Japanese empire sits on a bench and has very much the sort of desk every American boy and girl uses. Can you guess the reason? The Japanese have found that boys and girls grow taller and much sturdier if they do not sit on the floor with their legs cramped underneath them for hours at a time. Young men in the universities who have had our kind of physical training, and who were never obliged to sit on the floor during school days, are several inches taller than their fathers. So the Japanese must be right.

Taro and Yuki have a much harder task learning to read and write than children have in our country. Instead of learning 26 letters as an alphabet, they must learn 50 of one kind, 45 of another, and then, if intending to enter the university, they must memorize three or four thousand Chinese characters. These characters look like pictures. That is what they really were in the first place—pictures drawn to show a meaning. For instance, the Chinese character for "man" is a funny, two-legged picture. The one for "house" looks like a box with a roof over it. It takes 20 or 30 strokes of the brush to make some of these pictures. Can you imagine learning to make

3,000 of these little pictures? Do you wonder that it takes years of constant study to learn to read more than the simplest writing?

While Taro and Yuki are little they have most of their lessons in common. When ready for high school, they go to separate schools. Yuki will study household arts, tea-ceremony, flower arrangement, painting, music, and sewing. Taro will learn fencing and the special kind of wrestling that the Japanese call "jujutsu." Of course he will need also to work very hard in his study of English, so that he can understand his foreign teachers when he gets to college.

If you should ask Yuki what day in the year she likes best, she would not be long in answering you. At once she would say, "O Hina Sama," meaning "Dolls' Festival." This is a special holiday for Japanese girls and is celebrated on the third day of the third month of the year. The festival is kept throughout the nation in every home in which there is a little girl. Days beforehand the family starts getting ready. The dolls are placed upon a tier of shelves made like a miniature grandstand. This is covered with bright red cloth. On the very top shelf sit two noble figures representing the emperor and the empress. Next below come three court ladies and below them five court musicians. Every family owns these special dolls and most have a good many more. There are dolls representing knights and warriors, dancers and clowns, children and babies, old men and women. On the bottom shelves are set out toy furniture, cooking utensils, and food. Peach blossoms adorn the display and at night lighted candles make the scene even brighter. On the afternoon of the third of March, Yuki will invite all her little friends to her home. They will play with the dolls, and after pretending to feed them cakes and sweet wine, will eat and drink all the good things themselves.

A "PEEP SHOW" MOVIE IN JAPAN



Although they have the same kind of movies in Japan that delight the children of the rest of the world, they also have traveling peep shows, like this. "Going to the peep show" costs you a cent in our money.

The "Dolls' Festival" and the "Boys' Festival"

The celebration of the Dolls' Festival is not all play. Yuki's mother and grandmother make use of the occasion to teach her lessons in politeness and good taste and, most important of all, loyalty and respect for the Imperial family of Japan.

On the fifth day of the fifth month Taro has his particular holiday. This is the "Boys' Festival." Instead of dolls, swords, helmets, pieces of armor and figures of warriors adorn the red-covered shelves. A pole is set up in the garden and from its top floats a huge cloth fish, its round mouth wide open to the breeze. The carp is chosen as the symbol of the Boys' Festival. Taro's father tells him that as the carp swims upstream and leaps over waterfalls, so must he swim up the stream of life and overcome all difficulties. Taro's mother makes some cakes of bean paste for his supper, and before he goes to bed he takes a hot bath in which iris blossoms have been steeped. This is supposed to make him very strong.

Taro and Yuki both think that bedtime is the very nicest time of the day. For then they sit around the cheerful glow of the charcoal brazier and listen to the fairy tales which no one can tell so well as Granny.

"Granny, tell us about Momo Taro, the boy who sprang from a peach," pleads Taro.

"No, no, Granny, tell about the Sparrow with the Split Tongue," begs Yuki.

Granny smiles and says, "Settle it between yourselves."

Leaving it All to John Kem Po

So Taro and Yuki settle this in the way they decide all their disputes—by the game of John Kem Po. This is such a good way of deciding an argument that American boys and girls might like to practice it too. They put their right hands behind their backs. Then they shake their doubled-up fists in front of them, saying "John Kem Po" three times. As they say it the third time, they open their fingers to represent scissors, paper, or stone. The first two fingers spread out mean scissors, the wide-open palm stands for paper, and the clenched fist is a stone. Stone dulls scissors, scissors cut paper, and paper wraps stone. So stone wins over scissors, scissors over paper, and paper over stone. This time Taro happens to choose scissors; so he beats Yuki, whose flat pink palm shows her choice of paper.

"All right, Granny," Yuki says good-naturedly. "Taro wins and Momo Taro it shall be." So Granny repeats the oft-told tale of the Peach Boy and his wonderful feats in conquering giants and bringing home immense stores of hidden treasure.

Where BEAUTY RULES *the* HUMBLEST HOME



No elephants in the circus world were ever so celebrated as those elephants the Japanese ivory carver has caused by the wizardry of his skill to march in procession out of an elephant tusk. That scholarly looking gentleman is none other than Komei Ishikawa, the greatest ivory carver in Japan and, therefore, the foremost ivory carver of the world! The love of art is one of the most distinguishing characteristics of the Japanese, and they carry it into everything. The Japanese boys and girls, for example, devote the same loving care to making the letters of their alphabet that artists in other lands do to painting or drawing. Even kitchenware in Japan is usually a work of art.

JAPANESE ART. A love of the beautiful in nature and art is the inheritance of every Japanese child. The sense of beauty is universal among the people and one of the greatest charms in this land of so many fascinations is the fact that not only do her artists know how to produce marvelous porcelains, tapestries, and color prints, but that in the daily life of even the humblest there is exquisite taste and refinement. Daily toil and beauty, instead of being things apart, are inseparably connected in the lives of the Japanese. The iron kettles, cheap earthenware, and blue and white towels used by the poor are as artistic in their way as the expensive porcelains and beautiful embroideries of the rich. The Japanese people seem incapable of producing anything ugly or crude. Everyone is to a certain extent an artist, and a brief glimpse into the training of Japanese children will show how this has come to be.

In the Japanese language there is but one word, "kaku," for writing, drawing, and painting. From this it is easy to see that writing has always been looked upon as one of the fine arts. At least three or four thousand Chinese characters, or "ideographs," must be learned for daily use, and most of these may be written in several ways. The student who aspires to become a scholar must learn twice as many. By learning to master the difficult art of writing the Japanese child acquires a remarkable combination of qualities. Instead of placing his roll of paper upon a table as an American would, the Japanese student holds it in his left hand; he therefore must of necessity write from the shoulder and elbow as well as the wrist. He uses a brush dipped in India ink, and his writing paper, being porous, absorbs it immediately. The result is to produce strength, precision, and grace. Writing is an art that can seldom be mastered by a grown person, but when acquired in childhood it gives skill and deftness in other forms of art. One who has learned to write Chinese ideographs well can be taught to do almost anything else with the fingers. No wonder Japanese boys and girls think as highly of their skill in writing as we do of painting or drawing.

After the art of writing has been acquired, painting is the next step. For the Japanese child, no matter how young he may be, looks forward with eagerness to the time when his fingers will be sufficiently skilled to picture the beauties of the cherry blossom season, the moon rising over a pine tree, or the grandeur of Fujiyama, the sacred mountain of Japan. Many a laborious hour does the young artist spend in learning

how to make a single stroke. The beauty of Japanese painting lies in its half-veiled suggestions; the soul of things must be represented rather than their visible forms. These simple yet comprehensive precepts the teacher is at great pains to impress upon his pupils. Over and over again they strive to gain mastery of the few bold strokes that represent a river, or the straight lines picturing rain, blades of grass or shoots of bamboo. But the painstaking labor is not so irksome to a Japanese child as it would be to an American. It is often said that Japanese children are not so original in their thinking as the children of the West because of the strain on their youthful memories in mastering the written language. One thing, however, may surely be claimed for them—a genuine love of art, which makes pleasure instead of drudgery of the many long hours spent in mastering the use of the brush.

The appreciation of the beautiful is seen again in their love of flowers. Flower arrangement is taught as one of the arts, and much time is spent in learning, by twisting, bending, and clipping, to make each blossom and twig look as though it were actually growing. The making of miniature landscape gardens and pictures out of smooth white sand and tiny stones on lacquer trays is another artistic pursuit that delights Japanese children and heightens their feeling for design.

All this has given rise to the assertion that there are no mechanical arts in Japan because all such have been raised to the position of fine arts. This is surely true of the work of the potter, the wood-carver, and the craftsmen who produce such marvelous results in cloisonné, damascene, ivory, bronze, and lacquer. There is no sharp line of separation between artist and artisan, when both do their work with loving care and wonderful skill.

The potter's wheel, according to tradition, was introduced into Japan from China in the 8th century A.D. Five centuries later a Japanese potter discovered the art of glazing. Small jars of stoneware with brown glazes flecked with black were his first production. In 1598 the Prince of Satsuma invaded Korea and brought back with him 17 skilled potters, who taught the making of a ware which was called "Satsuma" in his honor. This is a glazed earthenware of firm texture, much like porcelain, decorated in color, and with the surface "crackled" just perceptibly. This so-called Satsuma ware is now made in a number of Japanese cities and is very popular for export trade. At the close of the 16th century a Korean potter at work in Japan discovered on Mount Izumi (in Hizen province) a peculiar clay needed to reproduce the blue and white porcelains of China. This "Hizen" ware, known also as "Arita," from the town of its manufacture, and "Imari," from the place of exportation, is today one of the finest wares made in Japan. The two centuries from 1645 to 1845 were the golden age of Japanese pottery. During that time the work was carried on under the patronage of noblemen and gentlemen of wealth, and no expenditure of time or toil was considered too great. Since the opening of the country to western influence, the Japanese have catered to western markets, so that pottery work has suffered through commercialization.

A MASTERPIECE IN BRONZE



This beautiful vase illustrates the skill with which the Japanese use enameling in the decoration of metal. The outlines of the figures are formed of metal strips and the space between is filled in with colored inlays. This specimen forms part of the noted Japanese collection in the Victoria and Albert Museum, London.

In the museums of Nara and Kyoto may be seen some wonderful examples of the ancient wood-carver's art, in the form of images believed to date from the 6th and 7th centuries A.D. At the end of the 16th century there was a new development in wood-cutting, in the carved decorations of temples, colored in gold and vermilion, the favorite Buddhist colors. These carvings represent flowers, birds, angels, and dragons, and appear on pillars, gateways, ceilings, and palisades. One of the finest gems of the wood-carver's skill is the "netsuke," a little figure designed to fasten the cord on a gentleman's sash or on the string of his tobacco pouch. The faces of these tiny netsukes have wonderful expressiveness.

The most notable piece of bronze in Japan is the Daibutsu, or Great Buddha, at Kamakura—nearly 50 feet high—which has been described as

> A statue, solid-set,
> And molded in colossal calm.

The image was formed of sheets of bronze, cast separately and finished off with a chisel. In ancient times the bronze-maker devoted himself almost exclusively to the making of images and temple



You would recognize this anywhere as a Japanese print. In its strength and delicacy of line, the careful balance of the composition, and its curious flatness, caused by the neglect of shadows and of perspective except for objects in the remote background, it is characteristically Japanese. Notice also the extreme economy of detail; observe, for example, with how few strokes the features are portrayed. This print, entitled 'Boating Parties on the Sumida River', is the work of Kiyonaga, one of the foremost color-print artists of the 18th century.

contained in the Easy Reference Fact-Index at the end of this work

adornments. Nowadays he makes vases, bowls, lanterns, and statues for commercial purposes.

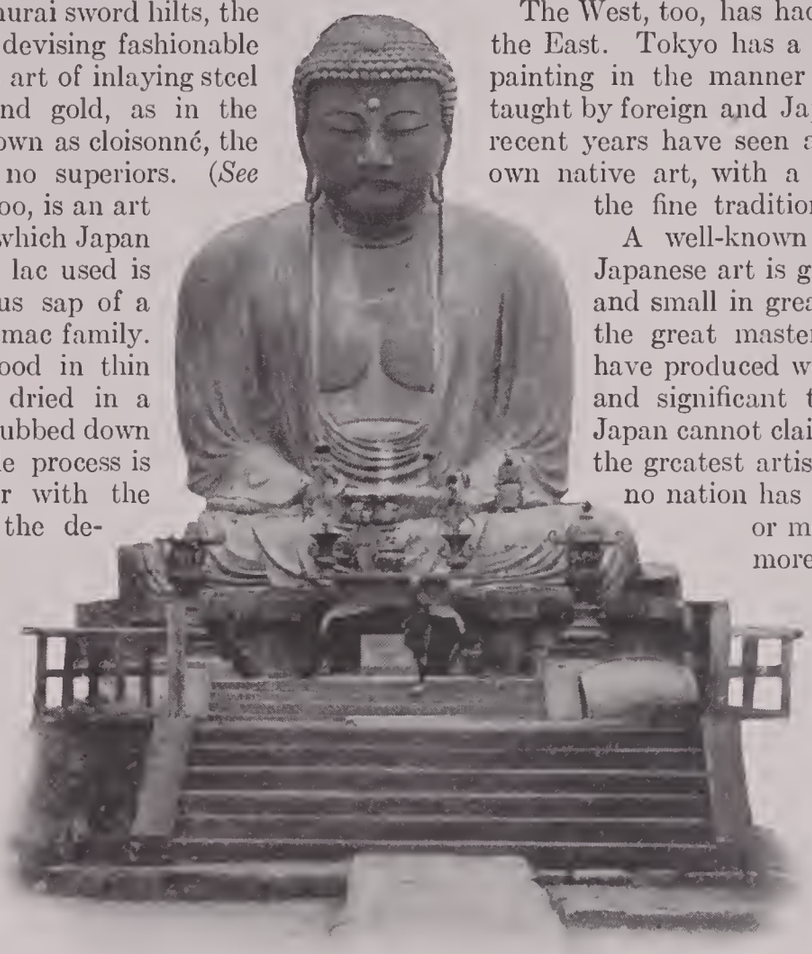
This is also true of the ivory carver and the master of damascene art. Instead of idols the ivory carver is making statuettes, fans, and umbrella handles; instead of fashioning Samurai sword hilts, the worker in damascene is devising fashionable jewelry. In this ancient art of inlaying steel and iron with silver and gold, as in the elaborate enamelware known as cloisonné, the Japanese workman has no superiors. (*See* Enameling.) Lacquer, too, is an art product in the making of which Japan cannot be excelled. The lac used is made from the poisonous sap of a tree belonging to the sumac family. It is applied to the wood in thin layers, and after being dried in a steam chest is carefully rubbed down and polished. The whole process is repeated over and over with the utmost patience, until the desired finish is obtained.

Of all the Japanese arts, the engraver's art of color printing is the one most admired in Europe and America. It unites the dexterity of the wood-carver and the skill of the painter, to form an art with power in every line and likewise grace and lightness of touch. The artist first draws his picture on transparent paper. Then the wood-carver pastes the drawing on a cherry-wood block, and dexterously cuts away the wood between the lines. Finally the printer mixes his vegetable color with a rice-paste and applies it to the engraving. A sheet of paper is placed on the inked block, and it is pressed down by rubbing with a pad. With painstaking care a separate block is made for each color, and color after color is printed until the original conception reappears in the finished print.

The greatest triumphs of color printing came during the 18th and 19th centuries, for that was the time when the great masters lived—Harunobu, Utamaro, Toyokuni, Hiroshige, and Hokusai—men almost as well known in the West as in the East. Indeed, one of the finest collections of the work of these great artists is to be found in the Boston Museum of Fine Arts. Collections of prints that found their way to Europe in the 19th century aroused great admiration, and had great influence upon artists of the West generally. The modern school of "impressionism" which began in France was partly inspired by the Japanese artist. Members of this school began striving to give the "impression" of the thing without picturing the whole of it, so that there came a decided change in their feeling regarding color. This showed itself in part in a fondness for more delicate tones.

The West, too, has had its influence upon the East. Tokyo has a school of art where painting in the manner of the Occident is taught by foreign and Japanese artists. But recent years have seen a reversion to their own native art, with a desire to maintain the fine traditions of earlier days.

A well-known maxim says that Japanese art is great in small things and small in great. True it is that the great masters of European art have produced works far more noble and significant than the Japanese. Japan cannot claim to have produced the greatest artists of the world, but no nation has had finer craftsmen or men who would work more painstakingly for perfection in details. While it is true that her artists have invented little, it is equally certain that they have invested with new grace and charm whatever they have borrowed from other lands, and their style has affected European art.



This image of Buddha at Kamakura, Japan is the most famous statue of Buddha in the world, not only because of its colossal size, but because of the impression of intellectual power and passionless serenity which it presents. It is 49 feet high, the face is 8 feet 5 inches long, and the eyes, made of pure gold, gaze down through lids nearly 4 feet long.

JAS'MINE. Hidden among its dull green foliage, the white waxlike blossoms of this garden shrub exhale a pungent perfume into the soft air of the southern June time, as though to say—

> Among the flowers no perfume is like mine,
> That which is best in me comes from within.
> So those who in this world would rise and shine
> Should seek internal excellence to win.

There are 150 species of jasmines, native especially to the warmer regions of the Old World, with at least one species in South America. The most common cultivated variety, the white jasmine, is a native of India and Persia. It grows from 6 to 10 feet high and because the stems are feeble it requires support. In the United States it is confined to the Southern states, because it does not easily endure the more northerly winters. The bright yellow-flowered shrub known as the Carolina jasmine is not a true jasmine but belongs to the genus *Gelsemium;* it is an important medicinal plant. In southern France and Algeria an

oil much used in perfume making is extracted from the jasmine blossoms. A Chinese jasmine is used for scenting tea, and in Turkey the wood is used for making pipe stems.

Scientific name of common white jasmine, *Jasminum officinale*. Flower, solitary, white, arranged in axillary panicles; 5 to 8 cleft calyx; a cylindrical corolla tube; 2 including stamens and a 2-celled ovary. Leaves are composed of leaflets in pairs with 1 single leaflet at the tip and are opposite, pinnate, and dark green.

JAVA. Long ago, legend tells, an aged ruler of Java, "the Pearl of the East Indies," lay dying. From his court in the misty mountain heights, where grow the oak, teak, chestnut, and towering blossom-crowned rasamala trees, his sons set out to search for a balm to heal him. And many and strange were their wanderings.

Like most natives of Java, Gundohl and Sukorini had yellowish brown skin, black hair and eyes, and flat noses. Both were dressed in the thin cotton trousers and short coat of bright colored silk that form the usual garb in the tropical climate of Java.

THE SACRED LIONS OF JAVA



These grotesque figures represent the Javanese artists' idea of lions. They are objects of sacred interest to the Javanese, for they are a part of the sculptured work of the great temple of Boro Budor, which is shown on page 1878.

Up and down the cultivated slopes of the mountain range stretching the length of the island Gundohl climbed. He sought the magic balm even in the lava beds around the two-score volcanoes which still rumble and breathe into the heavens their flame-reddened spirals of smoke.

He journeyed over Java's many emerald ravines and sparkling rivers; across prairies of silvery grass, with their great herds of deer; and through bamboo thickets where the tiger still roars defiance at white-helmeted hunters.

He ventured down into the island's rainy vine-draped forests, alive with myriads of destructive buzzing insects, and haunted by the fierce wild cat, the crop-destroying wild boar, and the clumsy one-horned rhinoceros.

The sudden coming of night—for at the Equator there is scarcely any twilight—would sometimes find Gundohl feeling his way through some marshy jungle where the "flying fox" and other great bats, some measuring five feet across the wings, whizz in and out of the treetops, while mischievous monkeys hang by their tails from the branches. In the sluggish waters of such woods the ravenous crocodile awaits his prey, and the innumerable snakes which kill scores of Javanese every year twist their slimy bodies over the orchids and the mosses.

At last Gundohl came to a river by which was a cave. And lo! out of the cave tripped a beautiful maiden, Tuan Patrie, who gave to Gundohl the magic balm!

Meanwhile, the weak Sukorini had grown weary of his search. Going down to the seashore, he idled away his time among the luxuriant ferns and palms, or within the thatched bamboo huts of the friendly folk who dwelled in those parts. Sometimes he hunted ducks, geese, snipe, storks, and pelicans along the swampy flats.

As ill luck would have it, he came upon Gundohl and Tuan just as they were about to depart, and—wretched scoundrel—stole the balm and hastened back with it to his father. Contaminated by his touch, however, the balm failed to heal.

At length, Gundohl and Tuan arrived, and when Gundohl applied the balm his father was instantly cured. The deceitful Sukorini was banished, and Gundohl and Tuan were married and later inherited the realm.

From this legend originated the names of the Gundohl River, the Cave of Gundohl, and the Grave or Mound of Sukorini, which are still wonder spots much visited by the Javanese.

Riches of Java's Fertile Soil

Nature has perhaps been kinder to Java than to any similar area in the world. It is a long narrow island—660 miles long and 40 to 125 miles broad—covering an area of 50,557 square miles, almost as large as Illinois. Forests of valuable timbers cover one-fourth of it. The most important of all the timber trees is the teak. Of the many others the upas (the native word for "poison"), one of Java's largest forest trees, is interesting because of the belief held until 1844 that it was extremely poisonous and destroyed all plant and animal life in its neighborhood. There is indeed a poisonous juice in the bark which is used by the natives on the points of their arrows, but otherwise the tree is harmless.

The rich black soil is prodigiously fertile, producing a profusion of flowers, fruits, and cultivated crops and

A GREAT PICTURE BIBLE OF THE BUDDHIST FAITH



This is the great Buddhist temple of Boro Budor, one of the architectural marvels of the world. Strictly speaking, it is not a temple but a hill surrounded with terraces of stone, in which are cut in relief thousands of figures telling of the religion of Buddha, and inviting mankind to the higher life. On the lowest terraces are scenes of ordinary life, men fishing, playing music, and so on. As the devout Buddhist ascends from terrace to terrace, he beholds the principles of the Buddhist religion portrayed in symbolic figures until finally at the top he comes to an image of Buddha himself.

TROPICAL RIVER SCENE IN THE "PEARL ISLAND"



This view taken near Batavia, Java, gives you some idea of the density and luxuriance of the vegetation in that "Pearl of the East Indies." Great palms rise from the river's brink, while further back grow teak and upas trees, and countless other forest giants.

MINISTERS OF THE SULTAN WATCHING A PARADE



The four gentlemen in the white fezes are ministers of the Sultan of Java and are watching a parade in Batavia, the capital city. You can see that they are personages of consequence by the umbrellas above their heads, for throughout most of the East the umbrella is a sign of rank and power and is carried by an attendant. In this case the ministers appear to be in a decidedly informal mood, and considerably amused by some incident or joke.

concealing most of the villages in luxuriant verdure. The climate ranges from tropical to temperate as one ascends the mountains. In the lowlands are the sugar and cotton plantations and the flooded rice fields, plowed by the strange mouse-colored buffalo of the island. A little higher are the famous coffee and tea plantations, and the groves of cinchona trees which yield a large proportion of the world's supply of quinine. Higher yet grow tobacco, cereal crops, and potatoes and other vegetables.

Its population of about 35,000,000 makes Java one of the most densely peopled regions in the world. The two chief groups of natives—the Javanese and the Sundese—speak distinct languages, though they are both of the Malayan race. Furthermore, each of these languages has three complete vocabularies, one used in speaking to superiors, one to equals, and one to inferiors. Though simple and superstitious, the natives are peaceable and industrious, nearly all of them being employed on the plantations. Cock-fights and a sort of Punch-and-Judy show are their chief amusements, and they are passionately fond of the weird music of orchestras composed largely of gongs and drums. The ancient faith was Hinduism, as is attested by the many ruins of splendid temples. The great temple of Boro Budor is probably the largest Buddhist temple in the world. Its statues and bas-reliefs placed side by side would form a line three miles long. Since the Arab conquest in the 15th century most of the people have been Mohammedans.

The Portuguese were the first Europeans to establish relations with the natives (about 1520), but were soon supplanted by the Dutch, who now rule the island. Holland derives from this colony a considerable portion of its revenues. The native sultans are in the pay of the colonial government and have only nominal authority. Most of the exports of sugar, coffee, tea, indigo, cinchona, tobacco, rubber, copra, and tin go to Holland. The production of petroleum is also becoming important.

JAY, JOHN (1745–1829). During the entire "Critical Period" of the formation of the American nation, John Jay, as a New York statesman and jurist, gave liberally of his time, labor, and money to support the cause of the patriots.

Descended from an old Huguenot family which had emigrated to America because of persecution in France, he was, like most of the Huguenots, well educated. In 1764 he was graduated from King's College (now Columbia University) in New York City, and four years later he was admitted to the bar.

Jay's naturally conservative tendency was increased by his legal training, and as a result he at first opposed the Revolution. But when it became clear that war was inevitable he threw in his lot with the patriots. In 1775 he was a member of the New York Com-

mittee of Correspondence, and for more than a quarter of a century thereafter he served in public office.

He was a member of the Continental Congress and of the New York legislature, was governor of his state, foreign representative of the United States, and chief justice of both New York and the nation. Besides this his pen was used, first to arouse the people at the beginning of the Revolutionary War, and then to secure the adoption of the Constitution; for with Hamilton and Madison he wrote the essays known as 'The Federalist', which ably urged the people to accept that frame of government.

During the Revolutionary War Jay's most conspicuous services were performed abroad. He was sent to Spain to make a treaty of alliance and secure a loan. In both of these efforts he was unsuccessful, not through any fault of his, but because Spain was not anxious to encourage rebellious colonies. Then he was ordered to Paris in 1782, to aid Franklin and John Adams in negotiating the treaty of peace with England. They were instructed to do nothing without the advice of France; but owing to Jay's suspicions of the French ministry (which proved correct), these instructions were disregarded and a much more favorable treaty was secured from England than the French statesmen were disposed to favor.

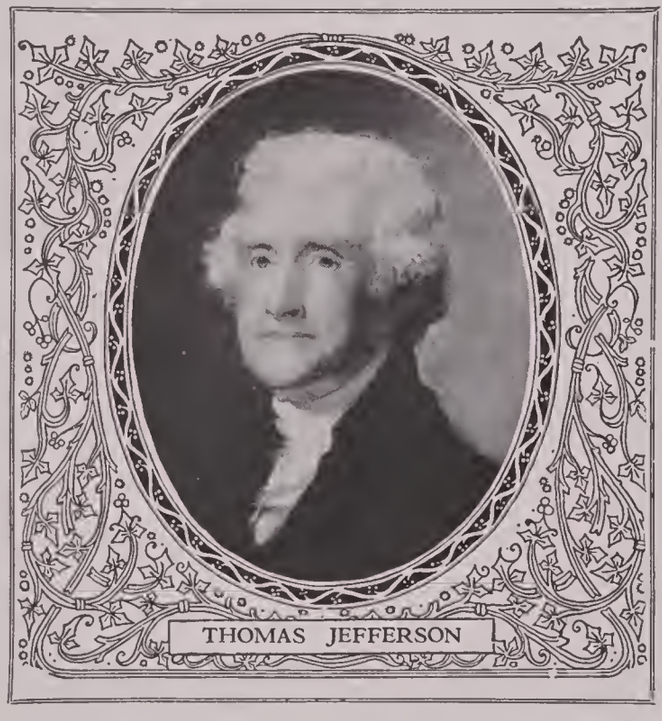
Because of this experience abroad, Jay was made secretary of Congress for foreign affairs when he returned. When the new Constitution went into effect in 1789, he was offered by Washington any position he wished under the new government, and he chose the office of chief justice of the Supreme Court. While holding this position, he was sent by Washington to England, in 1794, to negotiate the treaty known as Jay's Treaty. This was a sound and statesmanlike agreement, which settled many differences left over from the Revolutionary War. But it proved extremely unpopular with the Democratic-Republican party of Jefferson, which was bitterly hostile to England, and much abuse was heaped upon both Washington and Jay.

Jay resigned his position in the Supreme Court in 1795 to become governor of New York, to which position he had been elected during his absence in England. He was reëlected to that office in 1799, and at the end of his second term he retired to a secluded private life. He died May 17, 1829.

In politics Jay was a Federalist, but he never sanctioned partisan practices. No greater praise can be given him than that pronounced by Daniel Webster: "When the spotless ermine of the judicial robe fell on John Jay, it touched nothing less spotless than itself."

The FATHER *of* AMERICAN DEMOCRACY

JEFFERSON, THOMAS (1743 – 1826). When Thomas Jefferson asserted in the Declaration of Independence that "all men are created equal" it was to him no mere high-sounding phrase, but an expression of the principle upon which he believed all government should be based. Yet he was by birth an "aristocrat," for his mother was a member of the fine old Randolph family of Virginia. His father, however, belonged to the class of lesser landholders in the backwoods county of Albemarle, Va. Something of Jefferson's democracy may be due, perhaps, to the frontier influences of the Blue Ridge region in which he was born and reared. More of it was due to himself, for in later life he wrote that, after his father's death, "at 14 years of age the whole care and direction of myself was thrown on myself entirely, without a relative or friend qualified to advise or guide me."

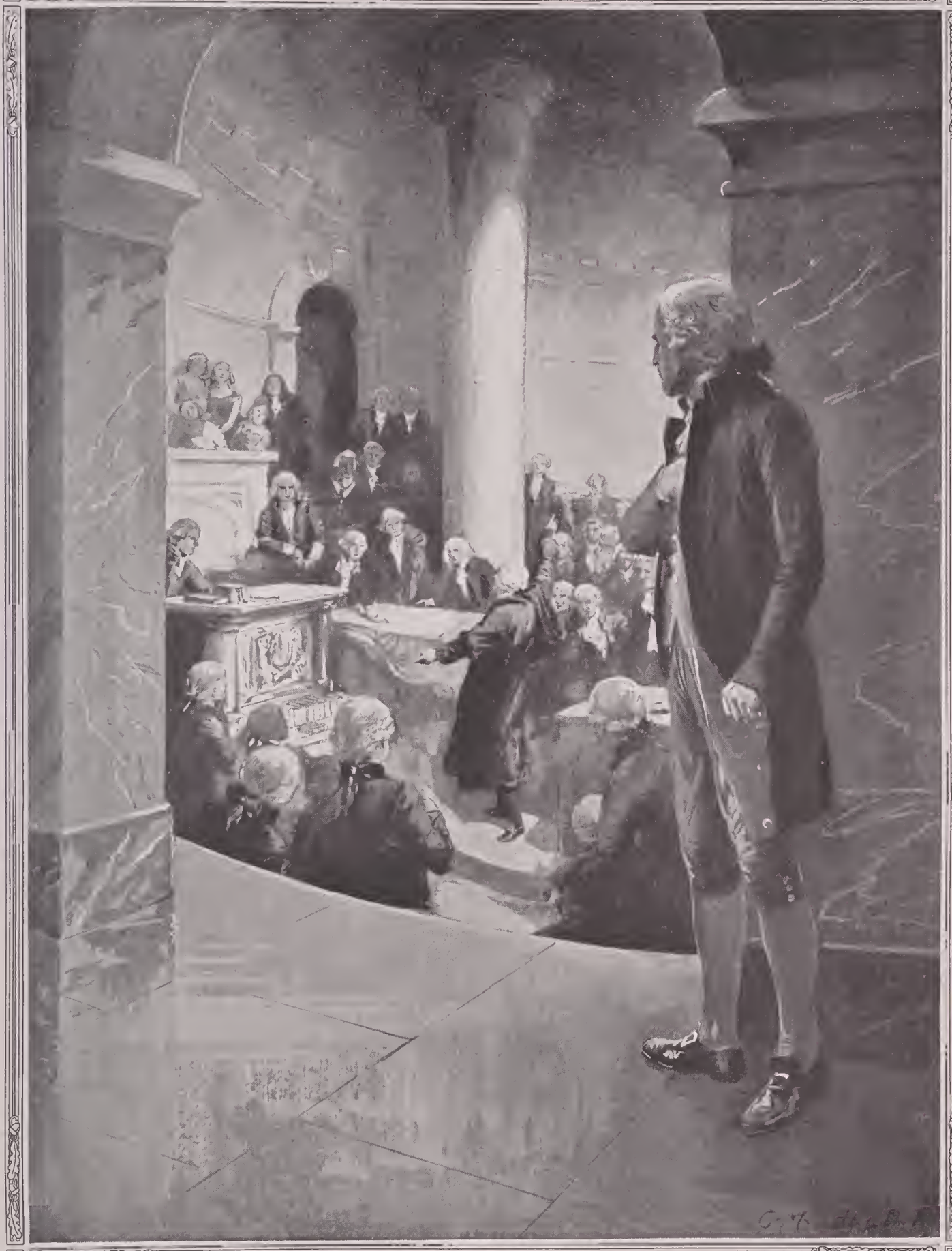


THOMAS JEFFERSON

Though the family was not wealthy—for land in that day did not necessarily mean wealth—their funds were sufficient for Jefferson to attend William and Mary College, from which he was graduated in 1762. He always set a high value upon his education, at one time declaring that if he were called upon to choose between the large estate left him by his father, and the education given to him, he would without hesitation choose the latter. He was fond of outdoor sports, an excellent horseman, and a skilled violinist, as well as a keen and eager student—a man of many accomplishments and of great personal charm.

After leaving college Jefferson studied law and in 1767 was admitted to the bar. But the law proved of only minor interest in the career of this many-sided man. He was also a statesman, diplomat, administrator, planter, and philosopher. Although he was successful in the legal profession, huskiness of voice rendered impossible long speeches, and he had no delight in the bitter personal clashes of the law courts. It has been said that in Virginia, during the Revolutionary War,

JEFFERSON LISTENING TO THE "TREASON SPEECH"



Here we see Jefferson standing in the hallway of the Virginia House of Burgesses while Patrick Henry is delivering his famous "Treason Speech." Protesting against the injustice of the Stamp Act, Henry cries: "Caesar had his Brutus, Charles the First had his Cromwell, and George the Third"—whereupon the presiding officer's shout of "Treason, treason!" is echoed by all the Royalist members—"George the Third may profit by their example," continues the orator. "If this be treason, make the most of it."

contained in the Easy Reference Fact-Index at the end of this work

"Washington was the sword of the rebellion, Patrick Henry its tongue, and Jefferson its pen."

Early in life Jefferson had been fired with the spirit of Liberty. He had stood in the hallway of the House of Burgesses (legislature) in 1765, when Patrick Henry uttered his famous words, "If this be treason, make the most of it!" He was naturally a bold and fearless thinker, and he had read the English and French political philosophers. He was elected to the House of Burgesses in 1769, and was a member of every succeeding assembly until he was sent to the Continental Congress in 1775. From the first he stood with the party of resistance against England. His views were set forth in a notable pamphlet entitled 'A Summary View of the Rights of America', a presentation which attracted widespread attention.

Jefferson was only 32 when he took his seat in the Continental Congress, but he at once became prominent. Reappointed by Virginia in 1776, he won imperishable fame as draftsman of the Declaration of Independence (*see* Declaration of Independence). Soon afterwards he resigned his seat in the Continental Congress to enter the legislature of Virginia, which had now driven out its royal governor and adopted a state constitution, though of a rather conservative sort.

Jefferson hoped to carry through a revision of Virginia's antiquated laws so as to bring them into harmony with democratic principles. In this he was only partially successful, for the old planter element was still strong, and it was swayed by conservative and aristocratic ideas. It was ten years before some of Jefferson's reforms were adopted, but in the end "the impress of his mind was in every part" of the statute book of Virginia. He introduced and carried through measures which abolished the entail of land and the exclusive right of the first born to inherit (primogeniture); and with these two laws gone, the old aristocratic social system "crashed to pieces almost in a day." Another law disestablished the Episcopal church and secured religious liberty. He failed in the attempt to pass laws for a gradual abolition of slavery in Virginia, but he remained opposed to it until the end of his days. His comprehensive plan for a system of popular education, also, including district, grammar, and classical schools, was not put into operation until many years later. In his old age he was successful in establishing the University of Virginia, the first of the series of state universities which have meant so much for education.

JEFFERSON'S ADMINISTRATIONS 1801–1809

Ohio admitted as a State (1803).
Louisiana Purchase (1803).
Lewis and Clark Expedition to the Pacific (1804).
12th Amendment to Constitution providing separate ballots for President and Vice-President (1804).
War against Tripoli (1801–05).
Trial of Aaron Burr (1807).
Importation of slaves into United States forbidden (1808).
Fulton's steamboat makes successful trip (1807).
Disputes with France and England over neutral commerce.
Impressment conflicts with England ('Chesapeake' affair, 1807).
Embargo Act in force (1807–09).

From 1779 to 1781, during the last dark days of the Revolution, Jefferson was governor of Virginia. In 1780 the state was invaded by the British and he could do nothing for his fellow-citizens and barely escaped capture himself. The times called for a man of action and a warrior, and Jefferson was neither. After peace was signed he served again in Congress, and rendered two important services. He introduced the decimal system of coinage (dollars, dimes, cents) in use today; and he prepared a plan for the government of the territory northwest of the Ohio River which provided for the prohibition of slavery in that territory after 1800. The substance of the provision was embodied in the later Ordinance of 1787.

In 1784 Jefferson was sent to France to assist Benjamin Franklin and John Adams in negotiating commercial treaties with foreign countries, and in the following year he succeeded Franklin as minister to France. He thus had no direct part in drawing up the Constitution of 1787. When the "new plan" was published he, like Patrick Henry and Richard Henry Lee, found much in it that seemed objectionable, but he trusted to later amendments to remove what he feared were dangers to the liberties of the people.

Jefferson served as secretary of state under Washington from 1790 to 1793. Alexander Hamilton was secretary of the treasury, and his views and those of Jefferson were so opposed that they rarely agreed. Jefferson believed in "states' rights" and a "strict construction" of the Constitution which would limit the powers of the Federal government to those specifically granted. Hamilton, on the other hand, saw clearly the need of a strong central government, and favored a "loose construction" of the Constitution, which would permit of the rise of a strong national government (*see* Hamilton, Alexander). Differences fully as bitter developed over foreign affairs. Jefferson and the "Republicans" (Democratic-Republicans) were ardent supporters of the French Revolution and favored France as against England, while Hamilton and the "Federalists" held opposite views.

At the close of 1793 the differences became so acute that Jefferson resigned from Washington's cabinet. In the election of 1796 he was chosen vice-president, with the Federalist, John Adams, as president. The four years that followed were marked by the bitterest party struggle. Then, in the election of 1800, came a political revolution which swept the Federalists from power and brought the "Repub-

licans" (Democrats), under Jefferson's leadership, into complete control. Aaron Burr became vice-president, in spite of a Federalist intrigue to substitute him for Jefferson.

As president, Jefferson tried to put into practice his cherished ideas of democratic simplicity. He was more impressed, however, with the need of repealing various oppressive laws passed by the Federalists and his removals of Federal officeholders to make room for Republicans exposed him to the charge of introducing the "spoils system" into the government. The Federalist judges, however, could not be removed, and in Chief Justice Marshall President Adams had left behind him a staunch defender of the national interpretation of the Constitution (*see* Marshall, John). The finances were ably administered by Albert Gallatin, a naturalized Swiss, as secretary of the treasury.

The Splendid "Louisiana Purchase"

The crowning achievement of Jefferson's first administration was the purchase of Louisiana from France (*see* Louisiana Purchase). Following this, he sent out the Lewis and Clark expedition to explore the new territory and to establish the claim of the United States to the Oregon country. He also dispatched a naval expedition to the Mediterranean to crush the pirates of Tripoli in North Africa who were interfering with American commerce. Jefferson, however, believed that armies and navies were dangerous to the liberties of a free people, and reduced both these arms to the lowest point possible.

In general the four years of Jefferson's first administration were years of prosperity, and he was reëlected in 1804 by an overwhelming majority, with George Clinton of New York as vice-president. One of the important events of his second term was the trial and acquittal of former Vice-President Burr, who was accused of treasonable plottings in the western country (*see* Burr, Aaron). Another was the passage of a law forbidding the slave trade after Jan. 1, 1808. But overshadowing all else were the growing difficulties in foreign affairs which finally led to the second war with Great Britain (*see* War of 1812). As a defense against the aggressions which both England and France practiced against neutral shipping, Jefferson persuaded Congress to pass an Embargo Act (*see* Embargo Acts) forbidding American ships to leave the harbors. If this law could have been strictly enforced, it would have ruined American commerce much more completely than the attacks of England and France could possibly have done. As it was, it brought New England to open threats of secession, and during the last months of Jefferson's administration the embargo was repealed. Three days later Jefferson retired from office, making way for the successor whom he had himself preferred, James Madison, his secretary of state.

The remaining 16 years of his life were spent chiefly at his beautiful plantation home, Monticello, in Virginia. Jefferson had always regarded agriculture as the best occupation for men and the foundation of all other wealth. He was a scientific farmer for his day, and was constantly endeavoring to improve methods and introduce new crops, for which he searched Europe. At the same time he kept in touch with public affairs through his numerous correspondents, and his personal influence was very great. As the "Sage of Monticello" he was still one of the most distinguished of Americans. People came from all parts of the country to visit him—"people of wealth, fashion, men in office, professional men, military and civil, lawyers, doctors, tourists, travelers, artists, strangers, and friends." His lavish hospitality, indeed, helped to bring him to financial ruin.

Jefferson died on July 4, 1826—on the same day as John Adams and just 50 years after the adoption of the Declaration of Independence. In accordance with his request this epitaph was inscribed on his monument: "Here was buried Thomas Jefferson, Author of the Declaration of American Independence, the Statute of Virginia for Religious Freedom, and Father of the University of Virginia." He was greater as a thinker than as a man of action. His mind flashed brilliantly from many facets, and he was ahead of his age in countless ideas. His warm-hearted political philosophy laid deep the foundations of United States democracy. Without Hamilton the new government might have lacked the force and vigor necessary to make it a success; without Jefferson it would have lacked that faith in average human nature which has made the United States the haven for the oppressed of the world.

JELLY-FISH. If you are a "landlubber" and don't know the animal life of the sea, you have a thousand surprises in store. For great numbers of quaint and beautiful and wonderful creatures are found only in the sea, forms of life so strange that you would think they must belong to another world. Great groups of animals, many thousands of kinds, are wholly marine, such as starfishes and corals, and many others. Among the strangest of these sea forms are the "jelly-fishes" or *medusae*, and their cousins, the corals and sea-anemones. With many others they belong to the great group of rather simple animals known as *Coelenterata*.

Jelly-fish! Almost all jelly, and not fish at all! There is no skeleton or any of the other things that make a creature a fish. But of jelly, more than nine-tenths of it! In some forms not much more than one per cent is really living matter.

A thousand kinds there are, varying in form and size and color. Even if you had a typical living specimen you would find it difficult to understand it fully, so different is it from the animals you usually see. A typical one may be umbrella-shaped, with few or many feelers or "tentacles," and sometimes simple eyes around the edge of the umbrella, and with the mouth and stomach in the position of the handle of the umbrella. Simple muscles on the under side contract the body much like the closing of an

umbrella, and cause the swimming of the animal, and also enable it to swim into deeper water during rough seas. With certain explosive cells in the tentacles, other small animals are paralyzed, and then drawn into the mouth by means of the tentacles. Other organs you think of as belonging to animals, you would not find—no brain or heart and blood-vessels or skeleton or kidneys. Yet it is an animal in the fullest sense.

The strangest thing about a jelly-fish is its life history. The egg hatches and swims about for a time as a very simple creature, wholly unlike the jelly-fish. It then settles down, becomes attached to some object, and develops into a small polyp. There it grows and buds, much like a limb of a tree, and becomes a colony of polyps, looking much like a branched bit of sea-weed. From these polyps there grow out finally tiny egg-shaped buds, which open out, pulsate, and swim away as little jelly-fishes. These, in the course of weeks or months, perhaps in some cases years, grow to full size.

Some jelly-fishes are just visible to the eye, some are two feet or more in diameter; some are so delicate as to melt in your hand, some are almost as firm as gristle; some are as transparent as glass, some brown or pink or white or blue; some are egg- or ribbon-shaped; some are modified into queer floating creatures, as the "Portuguese-man-of-war." While most jelly-fishes live at or near the surface of the sea, a few live at the bottom where the water is a mile or more deep. Some are phosphorescent, and look like great balls of fire when struck. All are strange and most fascinating.

SEE WHAT JELLY-FISH HAVE TO GO THROUGH!



The business of becoming a full-grown jelly-fish is a complicated process. Here we see the life history of one of the commonest forms, the Aurelia. First, the egg swims around as though it intended to stay just as it is. But soon it becomes attached to the bottom and begins to grow like a plant. This is the "polyp" stage. Soon the top of the polyp, carrying the arms, moves up and another cup-shaped segment is formed, and then another and another until there are 13 in all. This is the "strobila" stage. Then the top segment breaks off and swims away, and in the course of time turns into a real jelly-fish, like the ones you see here. Meanwhile the second segment of the strobila grows tentacles and splits off, and so on until 13 new jelly-fish have appeared.

JERSEY CITY, N. J. Commercially and industrially Jersey City is a part of Greater New York, though political geography makes it a part of New Jersey. Its situation at the center of the greatest port in the world makes its growth inevitable. Nine great railroads link it with the South and West; and four "tubes" under the Hudson River and numerous ferries connecting it with the heart of New York City make it a residential suburb of the metropolis. Its immense commercial and shipping interests are probably second only to those of New York, but as it is not recognized officially as a separate port, there are no separate statistics. The manufactures are exceedingly varied, including electrical and scientific apparatus, railway locomotives and cars, lead pencils and crucibles, jewelry and musical instruments, soap, and tobacco. It contains a large sugar refinery, and its great slaughtering and meat-packing industries make it the meat depot of New York.

For any subject not found in its alphabetical place see information

Jersey City has some notable public buildings and excellent schools. It boasts the magnificent Hudson Boulevard, 19 miles long and 100 feet wide, which extends along the ridge in the western part and gives an excellent view of the river and upper New York. Despite its remarkable position, the site of the city, known as "Paulus Hook," was used only as farming land until the 19th century. Now Jersey City ranks second in the state and among the first 20 cities in the country. Population, about 300,000.

The SACRED CITY of TWO FAITHS



Spread out before us is Jerusalem, the Holy City of both the Jewish and the Christian religions. What historic memories must crowd upon those who are fortunate enough to visit this hallowed spot!

JERUSALEM. "If I forget thee, O Jerusalem, let my right hand forget her cunning!" So sang the Hebrew psalmist as he thought with passionate devotion of the holy city from which he was exiled. In the Middle Ages the Crusaders, who had toiled the long weary way from their homes in Europe to redeem the city of Christ from Mohammedan rule, knelt in the dust and wept with joy as they beheld from afar the city of their dreams. Today, Jerusalem still draws hosts of pilgrims who come to kiss its crumbling ruins, to look upon the place of Christ's death and resurrection, and to approach with reverent awe its other holy places.

Standing on a rocky plateau, 2,500 feet above sea level, in the mountain region of Palestine between the Mediterranean and the Dead Sea, Jerusalem as seen from the neighboring hills is still as the Bible describes it, "beautiful for situation, the joy of the whole earth." Though the name Jerusalem means "city of peace," it is a natural fortress, and few cities have suffered more terrible sieges. Had it not been for the lack of water within its walls, it would in ancient days have been well-nigh impregnable, for deep-cut ravines protect it on three sides. Separating it from the Mount of Olives on the east and northeast is the Valley of Kidron. On the west and running to the south is the Valley of Hinnom, or Gehenna. This ravine was deemed accursed in ancient times, for here at one time human sacrifices were made to the Phoenician god Moloch, and later the bodies of criminals were cast out. For this reason the name Gehenna became synonymous with Hell, a place for torment after death. In ancient times another depression, the Valley of Tyropoeon, separated western Jerusalem, or the upper city, from the city of David (Zion) and Mount Moriah (the Temple Hill). But the rubbish that has been accumulating for centuries has almost filled up this ravine.

Ancient Walls and Holy Places

The walls surrounding Jerusalem have been many times destroyed and rebuilt. Those through which we enter the city today, by one of the eight gates, were built by Sultan Solyman the Magnificent in the 16th century. Portions of these probably rest upon more ancient foundations.

Of the splendid Temple, which was the center of worship for all Israel, no part remains standing today. The "Wailing Place," where every Friday Jews still gather to mourn and pray, was once supposed to be a part of the Temple erected by Solomon, but it is now known to belong to later times. A Mohammedan place of worship, the Mosque of Omar, now stands on the holy spot. Eight gateways open into its courtyard, within which, in the center of a group of buildings, is the Dome of the Rock, a fairy-like edifice, exquisitely wrought of marble and colored tiles.

The place in Jerusalem most visited by Christian pilgrims is the Church of the Holy Sepulcher, built

contained in the Easy Reference Fact-Index at the end of this work

over the supposed tomb of Jesus. No man can point with certainty either to Golgotha, the place of the crucifixion, or to the place of Christ's burial; but for ages men have made long pilgrimages to visit these "holy sites," have suffered and struggled and died for possession of them, so we cannot look without feelings of awe and reverence upon the reputed spots.

Franciscan monks tend with loving care the place which they believe to be the Garden of Gethsemane. Here several ancient olive trees are pointed out as the very ones in whose shadow Jesus knelt and prayed in anguish. Rising above the garden and overlooking the whole city is the Mount of Olives, associated with so many scenes of religious history.

Except for its memories of the past, Jerusalem is not an attractive city today. The streets are narrow and dirty, shut in by the high gloomy walls of the buildings, and often overarched, so that they seem almost like passages through caves. The houses are square and flat-topped, with few outside windows, as most of them open on inside courts. The streets are crowded with traders, beggars, and pilgrims and travelers from all over the world. There are many Arabs, Turks, and Christians, but the Jews, who have come back in great numbers within recent years, make up more than half the present population.

WAILING PLACE OF THE JEWS IN JERUSALEM



"If I forget thee, O Jerusalem, let my right hand forget her cunning!" So sang the Hebrew psalmist in exile from the Holy City of his faith, and the Jews in Jerusalem itself still come to this wailing place every Friday to mourn and pray. Those Hebrew carvings on the wall are prayers of pilgrims.

IN THE GARDEN OF GETHSEMANE



This is the Garden of Gethsemane at the base of the Mount of Olives as it looks today. The monk from the Franciscan monastery which the walls of the Garden enclose is standing under an olive tree which, according to tradition, was standing at the time of Christ's "agony in the garden."

The history of Jerusalem goes back to the 15th century before Christ, when, according to the Tel-el-Amarna letters, it was occupied by the Egyptians. At the time of the Israelites' entrance into Palestine, it was held by the Jebusites, a Canaanite tribe. David conquered the city and made it the capital of his kingdom It reached its greatest splendor under Solomon. After the division of the kingdom, it remained the capital of Judah until destroyed by the Romans under Titus in 70 A.D.

About 130 A.D. the Emperor Hadrian rebuilt the city and named it Aelia Capitolina. Its history from this time is obscure until the 4th century, when Constantine the Great after his conversion to Christianity gave orders for the recovery of the holy places and the erection of two magnificent churches. In 637 Jerusalem was captured by the Moslems. It was won by the Crusaders in 1099 and held by them until 1187, when it was reconquered by the Saracens. Except for brief intervals, it remained in the hands of the Mohammedans until it was captured from the Turks by British forces under General Allenby in 1917. The Peace Conference at the close of the World War made it the capital of a revived "Zionist" state, under the protection of Great Britain, thus making it possible for all Jews who so desired to return to their ancestral home. Population, about 70 000.

"SALVATOR MUNDI"—*The Story of Jesus*



"And when they had fulfilled the days, as they returned, the child Jesus tarried behind in Jerusalem; and Joseph and his mother knew not of it. And it came to pass . . . that after three days they found him in the Temple in the midst of the Doctors, both hearing them and asking them questions. And all that heard him were astonished at his understanding and answers." This passage from the New Testament is here illustrated by Hofman's famous Painting.

JESUS CHRIST. Strangely enough, history has little to tell us about this Man, who has had so profound an influence on the life and thought of the world. Practically all that is known about him is contained in the four Gospels of the New Testament—the Gospels of Matthew, Mark, Luke, and John. Written from 60 to 100 or more years after the birth of Christ, by men of different temperaments, these accounts naturally differ in some details, but they agree in all essentials.

Although in most civilized countries today time is reckoned from the birth of the founder of Christianity, a mistake was early made in regard to the date of this momentous event. We have no record to show the exact day or month or even year of the birth of Jesus Christ, but we do know that he must have been born four or five, or possibly even six years, before the so-called Christian era.

Jesus was born, we are told, in a manger in the little town of Bethlehem, in Judaea, about six miles from Jerusalem. To his mother Mary an angel foretold that she, a virgin, should bring forth a child who should be the Son of God. When her time was fulfilled Mary and her husband Joseph, a poor carpenter from Nazareth in the northern province of Galilee, had come to Bethlehem to be taxed, in accordance with the law of the Romans, who at that time exercised control over the land. Because there was no room for them in the inn they were forced to lodge in a cave hollowed out in the hillside and used as a stable for cattle. Yet the babe, born here in poverty, was descended, it was said, from David, the great king of Israel, and his coming was attended by signs and wonders. Guided by the songs of angels, shepherds who had been watching their flocks through the night came to this lowly spot and knelt in adoration before the cradle of the holy child.

The Coming of the Wise Men

Soon afterwards wise men, or "Magi" as they were called, came from the East saying, "Where is he that is born King of the Jews? for we have seen his star in the East, and are come to worship him." Herod, who was king in Jerusalem, upon hearing these words, was alarmed for the safety of his own throne, and secretly planned to kill the child. It is even said that he ordered all children two years old or under

to be slain. But Joseph, having been warned by an angel in a dream, fled with Mary and the child to Egypt, where they lived until the cruel Herod died. Then they returned and took up their abode in Nazareth, where Jesus passed his boyhood. Of these years, the Bible tells us only one incident. When he was 12 years old, Jesus went with his parents to Jerusalem, as was the custom, to celebrate the Passover. Returning home, his parents had traveled a long distance when they noticed that Jesus was not with them. Anxiously returning to the Temple, they found him sitting in the midst of the doctors, who were astonished by his understanding and wisdom.

From boyhood to manhood Jesus grew in strength and wisdom. When he was about 30 years of age, he was ready for his great mission. A short time before, a prophet had appeared, announcing the near approach of the long-awaited Messiah or Christ, and calling to the people to repent and prepare for the kingdom of God. From the fact that he baptized his followers in the River Jordan, he is known as John the Baptist. Jesus himself came for baptism, and John recognized in him the one mightier than himself, whose coming he foretold.

Preparation for His Great Work

In order to prepare himself for the great work that now lay before him, Jesus went alone into the wilderness, and for 40 days and 40 nights he fasted and prayed, struggling with temptation. After his return there gathered about him a little group of disciples who recognized him as the Messiah. Gradually the numbers of these followers increased, and from them were chosen the 12 apostles who were especially appointed to spread his message (*see* Apostles).

Jesus showed miraculous powers in turning water into wine at the wedding at Cana, in healing the sick, in feeding 5,000 with five loaves and two fishes, and in performing many other wonders. Wherever he went he sought out the lowly, associating with publicans (the despised tax-gatherers), with the poor and the maimed, even sinners. To all who were suffering he brought a message of comfort: "Come unto me, all ye that labour and are heavy laden, and I will give you rest." Love was the keynote of his preaching. "Thou shalt love the Lord thy God with all thy heart, and with all thy soul, and with all thy mind, and with all thy strength; this is the first commandment. And the second is like, namely this, Thou shalt love thy neighbour as thyself." He even taught, "Love your enemies, do good to them which hate you." He bade men follow the law of Moses and the words of the prophets. "Think not I come to destroy the law, or the prophets," he said; "I am not come to destroy, but to fulfil." But he saw that many of the Pharisees, who boasted of their strict adherence to the Jewish law, followed only the letter of the commandments, and forgot the spirit. For this he did not hesitate to denounce them; while they in turn looked upon him as a revolutionary, accused him of breaking the Sabbath because he healed the sick on the day of rest, and regarded as blasphemy his claim to be the Son of God.

When Jesus at last went to Jerusalem he had long known that he must suffer and die. On Passover Eve, he ate his last supper with his 12 disciples and retired for prayer to the Garden of Gethsemane. There he was betrayed by Judas Iscariot, one of the Twelve. He was arrested, and brought before the Sanhedrin, the Jewish council of priests and elders. After a hasty trial, they pronounced him guilty of death for blasphemy; but as they had no authority to pass the death sentence, they delivered him up to Pontius Pilate, the Roman governor. Pilate, after washing his hands to show that he was innocent of the blood of the prisoner, yielded to the demands of the multitude and gave him up to be crucified. With a crown of thorns upon his head and arrayed in a purple robe, which the soldiers placed upon him in mockery, Jesus was led to Golgotha, the place of execution. There, with a criminal on either side of him suffering the same punishment, he died upon the cross, crying in his last agony, "My God, why hast thou forsaken me?"

Jesus' body was taken from the cross and placed in a tomb by Joseph of Arimathea and Nicodemus. Three days later, on the first day of the week, when some of the women came with spices to embalm the body, they found the tomb empty. An angel who kept watch told them that Christ had arisen from the dead. The risen Christ appeared first to Mary Magdalene, the once sinful woman from whom Jesus had cast out seven devils, and who had become one of the most devoted of his followers; and then to others who had been close to him. He spent 40 days on earth after his resurrection, and then from the midst of his disciples he was taken up to heaven. He left no writings and no organized church. But from recollections of his teachings his followers later put together the record of his ministry, as we have it in the New Testament, and with it there slowly took shape also the organized Christian church, which more and more has ruled men's lives. (*See* Church, Christian; Papacy.)

JETTY. Embankments or piers built in rivers and harbors to increase the depth of the water by narrowing the channel and thus increasing the scouring action of the current are called jetties. They are particularly valuable where a river empties into a sea which is more or less tideless. In such cases the sediment brought down by the stream is continually being deposited at the mouth, forming a delta, because there is little or no scouring action due to the flow and ebb of the tide. The jetties at the mouth of the Danube, constructed between 1858 and 1868, increased the depth of water from $9\frac{1}{2}$ feet to 22 feet. The Mississippi jetties, built by James B. Eads in 1875-79, are notable among engineering achievements. They were made by sinking mattresses of interwoven osiers, and covering these with stones and concrete, forming broad and strong containing walls.

The CHILDREN of ISRAEL—the "Eternal People"



Moses Bringing Down the Tablets of the Ten Commandments from Mount Sinai

JEWS. A people scattered over the length and breadth of the earth for almost 19 centuries, and still remaining a distinct race, though mingling with the people of many lands, the Jews have well been called "the eternal people." We cannot speak of the Jews merely as an ancient people, as we do of the ancient Assyrians and Babylonians, for they are still a living race, and a vital force in the world today. Though they number only about 15,000,000, or less than one-tenth of one per cent of the population of the world, we cannot mention any important field of human activity without finding many Jews among the great names.

The same intensity of character that made Israel a great nation in ancient times has given the Jews of today distinction in every department of life. For in mental and moral traits, and even in form and feature, the Jew of today is much the same as his forefathers of the days of Solomon and David.

No other people has preserved its racial character almost unmodified for so long a time; no race has endured greater sufferings and misfortunes; and no race, in proportion to its size, can boast of more glorious achievements or more lasting culture.



SCROLL OF THE LAW

This is the Scroll of the Law used in Jewish synagogues. On the right is the breastplate worn by the rabbi, and on the left the pointer with which he follows the text. In reading the scroll, it is unrolled from one roller and rolled up on the other.

The history of the Jews begins in a far-distant past, when this people were wandering Semitic tribes of the Arabian desert, slowly drifting into Palestine (*see* Palestine). According to the Bible, the great forefather of the race was Abraham, who about 2000 B.C. led his people forth from Ur of the Chaldees at the divine call, to found a nation dedicated to the service of the one God (*see* Abraham). Because he came from beyond the Euphrates River, Abraham was called "the Hebrew" (from a word meaning to "cross over") and this name was given to his descendants. Isaac, who succeeded Abraham as patriarch of the tribe, had twin sons, Esau and Jacob. Jacob, whose name was changed to Israel, gained the leadership. He was followed by his 12 sons, who became the heads of the 12 tribes, known as the Israelites. Esau settled in a land near Canaan, and founded a people later known as Edomites.

contained in the Easy Reference Fact-Index at the end of this work

Jacob's fondness for his son Joseph aroused the jealousy of the other brothers and they secretly sold him as a slave to some merchants on their way to Egypt. But Joseph through his honesty and wisdom gained the favor of the Pharaoh, or ruler, and rose to the position of prime minister of Egypt. After a time, because of famine in Palestine, Jacob and his sons came to Egypt to buy grain. Through Joseph's influence they and their families were given land, and there they remained for generations, enjoying prosperity and greatly increasing in numbers. But in after years, according to the Bible account, the Egyptians became jealous of the Israelites and made them slaves. From this oppression they were delivered by Moses and led back to Palestine, or Canaan, "the Promised Land," which was then inhabited by a highly civilized Semitic people called the Canaanites. Before this time the Israelites had been a wandering shepherd people; now, under the laws established by Moses and the influence of Canaanite civilization, they gradually grew into a strong nation (*see* Moses).

THE SACRED TRUMPET



This ram's horn is blown in connection with the religious ceremonies of the Jewish New Year festival.

The Jews in the Land of Canaan

Moses was succeeded by Joshua, who led the Israelites across the Jordan River, taking possession of the land of the Canaanites and dividing it among the tribes. Levi, the priestly tribe (whose members were called Levites), was given no land, for its members were to dwell among the other tribes as religious leaders. Joshua won many victories against the Canaanites, but the Israelites were still sorely harassed by them and other warlike tribes, especially the Moabites, the Ammonites, and the Philistines (*see* Philistines).

To lead the people during these troublous times, officers known as "Judges" were appointed. Among the most famous of these were the warrior Gideon, the woman-judge Deborah, and Samson, who performed marvelous feats of strength. In the time of the prophet Samuel, the people decided that they must have a stronger form of government and demanded a king. For this office, Saul was chosen. He united the tribes of Israel into a strong kingdom and won many brilliant victories, but he and his son Jonathan both fell in battle against the Philistines.

David was then proclaimed king and peace was at length established throughout the land (*see* David). Under his son Solomon the kingdom reached its greatest prosperity and glory (*see* Solomon, King of Israel). When Solomon's son Rehoboam ascended the throne the ten northern tribes revolted and made Jeroboam king. Only Rehoboam's own tribe of Judah, together with the little tribe of Benjamin, remained faithful to the house of David. From that time on (the 10th century B.C.) the land of the Hebrews was divided into two kingdoms—the northern one being known as Israel, and the southern as Judah.

Feeling was bitter between the two kingdoms and border wars were frequent. Israel was rich and prosperous; its land was fertile, and its people dwelt in towns. But the land of Judah was stony and sterile; Jerusalem was its only large town, and most of its people still clung to their old shepherd ways of life. Religious differences also arose because the town-dwellers of the north were easily led to adopt the heathen worship of the Canaanites, just as they borrowed other elements of Canaanite civilization.

National Decay and the Assyrian Conquest

Jeroboam forbade his people to worship at the temple in Jerusalem, and introduced idolatrous worship. Under his successors the country went from bad to worse. Finally in 722 B.C. the Assyrians captured Samaria, the capital, carried the mass of the people into captivity, and put an end to the kingdom of Israel. The ten tribes were thus lost to history. Their place was taken by Assyrian colonists, who mingling and intermarrying with such Israelites as were left, formed the people known as the Samaritans.

The little kingdom of Judah endured for more than a hundred years longer, though its position between the powerful states of Egypt and Assyria exposed it to repeated invasions. For the most part it remained faithful to the ancient religion. Under King Hezekiah, Jerusalem was strengthened and an attack of the Assyrian army under Sennacherib was driven back. King Josiah was slain in a battle with the Egyptians, and Judah was forced to pay tribute to Egypt. The weakened kingdom finally fell a prey to the Chaldeans, who had become the great world

A TRAGIC EPISODE IN JEWISH HISTORY



This is a chapter in the long sad story of the persecution of the Jews in Europe. It represents a scene at the time of the coronation of Richard I, when a mob fell on the rich Jews who came to offer their presents to the king, murdering many of them and plundering their houses.

power. Jerusalem was captured by Nebuchadnezzar in 586 B.C., most of the people were carried away into exile in Babylon, and the once flourishing kingdom of Judah became a wilderness, as the prophets had foretold (*see* Prophets).

After about 70 years, the Chaldean Empire was overthrown by the Persian king Cyrus, who permitted the Jews who so desired to return to Jerusalem and rebuild the temple. Later Ezra the Scribe led another band back to Jerusalem, and brought about a great religious awakening. A few years later Nehemiah, a Jew, was appointed governor of Judea, and in this position was able to do much for his people. During this period the writings contained in the Hebrew Bible were collected and arranged, and the religion of Judaism came to full flower.

After the conquests of Alexander and his death (323 B.C.) the Ptolemies of Egypt ruled Judea for about a hundred years and then it fell into the hands of Syria. The Syrian king Antiochus Epiphanes outraged the feelings of the Jews by setting up idols and ordering the people to worship them. The aged priest Mattathias raised the flag of revolt, and under the leadership of his five sons, known as the Maccabees, the Jews defeated the Syrian army, and finally won their independence (130 B.C.).

Before long, however, the people became divided into parties, or sects, such as the Pharisees and the Sadducees. A dispute arose between two claimants to the throne, and Rome, with whom an alliance had been formed, was called upon to act as arbiter. The Roman general Pompey took advantage of the situation to make himself master of Jerusalem and force the Jews to pay tribute. When Julius Caesar came into power he placed a foreign ruler, Antipater the Idumean, over Judea. Antipater's son and grandson ruled from 37 B.C. to 39 A.D. (*see* Herod). Under the Roman governors who followed there were frequent insurrections, culminating in the great Jewish war of 66 A.D. After a long siege the Roman general Titus, afterwards emperor, took Jerusalem in 70 A.D., burned the temple, massacred thousands of Jews, and captured thousands of others to be sold as slaves.

The Jewish nation was destroyed, but not their spirit. Dispersed throughout the world, they established synagogues wherever they went and their rabbis, or masters, continued the teaching of the law. The very fact that they were dwelling among strangers made them cling with greater tenacity to the very letter of this law, following it in every detail of their lives. Even their food must be *kosher*, that is "clean" according to the Mosaic law.

But it was only at the cost of terrible suffering that the Jews remained faithful to their religion. Their history, from the time of the dispersion until recent times, is for the most part a long succession of persecutions. In many places they were forced to live in crowded quarters called *ghettos* and compelled to wear a distinguishing dress. They were not allowed to own land and were forbidden to

THE TRIUMPH OF A GREAT JEWISH HEROINE



The story of how Esther, wife of Ahasuerus, king of Persia, saved her people from the cruelty of Haman, the king's chief minister, is a favorite Jewish tradition. Here we see the moment when Esther denounces Haman at the royal banquet, and exposes his plot. The next day Haman was hanged. The Jewish Feast of Purim commemorates the story to this day.

practice handicrafts. Trading and money-lending were the only pursuits open to them. The shrewdness which many of them developed became a reproach to the whole race. For a long time they were deprived of political and educational privileges in most European countries, and were exposed to the violence of mobs that time and again rose against them, massacring men, women, and children. In Russia the Jews were forced to live in a restricted area called the "Pale of Settlement."

In most countries, Jews today enjoy equal rights with other citizens. Not only have they proved their loyalty, but many Jews have risen to positions of leadership in state affairs.

The persecutions which the Jews have suffered caused many of them to look with longing back to their former home in Palestine, and to hope that the Jewish state might be restored in the Promised Land. Out of this desire and hope has grown the Zionist movement. It is of course impossible to bring all the 15,000,000 Jewish people back to Palestine, and the majority are content to dwell in their present homes. But it is the purpose of the Zionists to provide a home for the oppressed Jews in Palestine.

It would be impossible to name all the Jews who have won distinetion in modern times. In England, from the time of Disraeli, who rose to the position of prime minister, to Earl Reading, chief justice, there have been many prominent Jewish statesmen. In Germany we find the great leaders of the people Edouard Lasker, Ferdinand Lassalle, and Karl Marx; and in France, Gambetta, the famous lawyer, statesman, and premier. Among the many Jews who have played a leading part in Ameriean affairs are Louis D. Brandeis, Justiee of the Supreme Court; Osear Straus, who served as Seeretary of Commerce and Labor and has held many diplomatic positions; and Henry Morgenthau, who was ambassador to Turkey in the early years of the World War.

From aneient times Jews have shown their ability as seholars, seientists, and philosophers. Henri Bergson and Felix Adler, as leaders of thought, may be eounted among the sueeessors of Spinoza and Moses Mendelssohn. Dr. Simon Flexner, direetor of the Roekefeller Institute of Preventive Medieine, is one of many Jewish leaders in the medieal world; while Heinrich Hertz has won fame through his diseoveries in electrieity and magnetism.

Among eountless Jewish writers are the poet Heine, one of the greatest lyrie geniuses of the 19th century; Berthold Auerbach, the novelist, and Ludwig Fulda the dramatist, both prominent among German writers; the English dramatist Pinero; Israel Zangwill, writer of plays and stories of Jewish life; and the erities Max Nordau and Georg Brandes.

In music the Hebrew raee has shown special genius. The eomposers Felix Mendelssohn, Meyerbeer, Brueh, and Offenbach; the pianist Rubenstein, and the violinist Joachim are immortal names; while Miseha Elman, Efrem Zimbalist, Jaseha Heifetz, and Alma Gluek are the idols of the public today. Among great Jewish aetors and actresses are Rachel, Bernhardt, Nazimova, and David Warfield.

For any subject not found in its alphabetical place see information

SAINT JOAN OF ARC, *the Maid who Saved France*

How the Gentle Country Girl was Led by Visions to Take Up the Sword for France —Her Remarkable Success in the Field and Her Cruel Death at the Hands of the Enemy

JOAN OF ARC (1412–1431). In all history there is no story more romantic, or figure more noble and sweet, than that of Joan of Arc—Jeanne d'Arc (*zhän därk*), as the French call her—the hero maid who saved France from conquest in the first half of the 15th century. Her home was at Domremy, in the valley of the river Meuse in northeastern France; and her father, Jacques d'Arc, was a well-to-do peasant proprietor, owning a farm on the outskirts of the village. His daughter never worked in the fields, but helped her mother with the spinning, weaving, and other household duties. There were playtimes, too, for the French believe in innocent social pleasure, and energetic, good-tempered, kindhearted Jeanne was a general favorite in the village. But often her heart was troubled by what she heard of the condition of her beloved land. For many long years it had been wasted with war, and now the whole northern half was in the hands of the English and their ally, the Duke of Burgundy. Its young prince, Charles VII—called the *Dauphin* because he had not yet been crowned king at Reims—was without money, armies, or competent generals, and expected shortly to lose that part of France which still remained in his hands.

JOAN RECEIVING THE SWORD OF ST. MICHAEL



This picture, from a French painting, shows Joan of Arc about to receive the sword from the Archangel Michael, in obedience to the message that she should lead the French troops to victory and free France of its invaders.

So, as Jeanne grew to be 13, when her girl friends were beginning to think of lovers and marriage, she became devoutly religious. Loving quiet and solitude for holy thoughts, she often took the dog and watched her father's little flock of sheep, while she worked an altar cloth with the exquisite embroidery which afterwards occupied dark days in prison. On the breezy hillside, in the orchard, and as she knelt before an image of the Virgin in the village church, Jeanne began to hear heavenly voices and to see visions—of Saints Margaret and Catherine, and of the angel Michael, patron saint of soldiers. Their message was that she should go to the Dauphin, lead his troops to victory, and free France of the invaders. Her sorrowful family and the village priest tried to dissuade her, thinking her distracted; but she was determined to obey her "voices." And such is the power of consecration that she overcame the opposition of officials, bishops, and nobles, reached the Dauphin himself, and won his belief in her mission.

contained in the Easy Reference Fact-Index at the end of this work

Now, clad in the shining armor of the Middle Ages, Jeanne went forth, mounted on an armored horse, bearing the sword which Charles Martel was said to have used against the infidel Saracens, and with the golden-lilied banner of France waving above her, she led an enthusiastic army to the relief of the walled city of Orleans, which the English at that time were besieging. Cutting boldly through the enemy, she entered the city. In four days of masterly sallies and attacks she sent the enemy flying. This was in May 1429, when she was not yet 17. In July Jeanne was able to conduct the Dauphin in triumph to Reims Cathedral, for coronation at the altar where the kings of France were always crowned.

Jeanne now regarded her mission as finished, and begged permission to return to her home. She declared her unfitness to remain at the head of the army, since her heavenly "voices" had deserted her. The king however persuaded her to remain, and she marched to drive away the Burgundians who were besieging Compiègne. Here she was defeated, taken prisoner, and sold as a prize of war to the English. For months she was kept in a gloomy prison in the Norman city of Rouen, on the Seine, and was subjected to shameful indignities and a long trial. Delivered to her enemies, and abandoned to her fate by the ungrateful king and courtiers, she defended herself in her trial with great skill and courage. In the end she was convicted of witchcraft and heresy, and was burned at the stake in May 1431. An Englishman who stood by, impressed by her bravery, exclaimed, "We are lost, for we have burned a saint." A quarter of a century later Jeanne was declared innocent by the Pope, and on May 16, 1920, she was formally enrolled as a saint of the Catholic church. The immortal deeds and piteous death of "the Maid of Orleans" have inspired sculptors, painters, and poets for five centuries, while to France she is a national glory.

A SAD MEMORIAL OF JOAN



This tower in Rouen, known as the Tower of Joan of Arc, was the scene of the trial which was followed by her martyrdom. The tower once belonged to a castle built by Philip Augustus in the 16th century.

Job. The most sublime treatment of the great mystery of human suffering is given in the Book of Job in the Bible. The hero of this dramatic poem is a wealthy chieftain of the land of Uz, somewhere between Palestine and the Euphrates, who is noted as a godfearing and upright man. But to test whether his righteousness will remain strong in suffering as in prosperity, God allows Satan to afflict Job with terrible misfortunes—the loss of his children, the loss of his property, and the attack of a loathsome disease.

When Job cries out in his great anguish, his friends come to him and tell him that all this suffering has come upon him through sin. But Job refuses to believe that his suffering is punishment for wrong-doing; he cries out to God for some other explanation. Filled with pain and doubt and discouragement as Job is, he still has not lost his faith in God. "I know that my Redeemer liveth," he says; and at last God, speaking out of the whirlwind, answers him. Job, humbled by this vision of God's power, bows in submission, realizing that the great mysteries of life are beyond man's understanding.

The Book of Job is regarded by scholars as among the latest Old Testament books, having been written about the 4th or 5th century B.C. The character of Job is probably a creation of the unknown author, rather than a real person, though there may have been some foundation in history. The book ranks with 'Hamlet' and 'Faust' as among the greatest poems dealing with man's spiritual history.

Joffre (*zhô'fr'*), Joseph Jacques Césaire (born 1852). "The Victor of the Marne," who halted the overwhelming rush of the Germans in 1914 and saved Paris and France, rose from the humblest circumstances to an imperishable place in history. His father was a maker of wine casks in the extreme southern part of France. The boy was so little interested in this kind of work that his father once declared, "If our Joseph amounts to anything it will be at his books, and not at the cooper's trade." So the future Marshal of France was sent to the famous École Polytechnique in Paris, where he prepared himself for a military career.

Before the young man had finished his education he was called to arms in the Franco-Prussian War of 1870–71. At the end of the disastrous siege of Paris he saw the victorious Germans march into his beloved city. He never forgot that scene, and he spent the next 40 years in making himself and France ready, should the Prussian foe strike again. Joffre completed his military training and saw many years of service in the French colonies in Africa and Asia. He superintended the building of defenses at many important points, and thus had an extended experience in military affairs. This had raised him to the position of chief-of-staff of the French army, when the World War broke out in 1914.

Joffre was at once made commander of all the French forces on the Western front, and held this

position for two years. In the face of the powerful and crushing onslaught of the German army through Belgium, he ordered his troops to retire mile after mile into France. Many feared that the boast of the Germans to "take Christmas dinner in Paris" would be realized. But Joffre was calm. "I mean," he declared, "to deliver the big battle in the most favorable conditions, at my own time, and on the ground I have chosen."

"PAPA" JOFFRE, THE HERO OF THE MARNE



This is the great simple-hearted citizen of France whose patience, courage, and skill achieved the glorious victory on the Marne. The very soldiers who won this battle for him, for France, and for the liberty of the world, gave him the affectionate nickname "Papa," to express their appreciation of his paternal care for them and their trust in him.

After five weeks of wearying and discouraging retreat, the clarion call went forth (Sept. 6, 1914): "Soldiers, we are attacking. Advance as long as you can. When you can no longer advance, hold your position. When you can no longer hold it, die!" Every man responded to this call. The result was the glorious victory on the Marne River, and all France acclaimed "Papa" Joffre as the savior of France. When he visited the United States as a member of the French High Commission shortly after America entered the war, the American people also were aflame with enthusiasm for his heroic services and the simplicity and nobility of his character. Despite all his honors and triumphs, he remained the simple big-hearted man who thought only of his country and her need.

For Joffre's invaluable services, his country conferred upon him the title of marshal, the highest military honor in France, and decorated him with the grand cross of the Legion of Honor. These honors he bore quietly and modestly, saying: "I am a citizen of the Republic, nothing more." To have served his country faithfully and well was his proudest distinction. The affectionate nickname "Papa," which his soldiers bestowed on him, shows how greatly he endeared himself to them by his genial democratic ways and his unfailing care for their comfort and safety. His removal from the active supreme command, at the end of 1916, was no reflection upon his ability or patriotism. It was the result merely of a desire to try other tactics and other men, in the supreme task of defeating the German armies.

JOHANNESBURG, SOUTH AFRICA. Ringed about by the little circle of mountains called the Witwatersrand, which produces one-fourth of the world's yield of gold each year, Johannesburg is a city literally "born with a gold spoon in its mouth." For 50 miles around the city the bare, open, and rather desolate rolling plateau is dotted with the tall chimneys of "workings" and the houses, as alike as peas in a pod, in which Chinese and Kafir laborers live during their stay in this greatest mining camp of the world. The ears of the city itself are assailed by the frightful clamor of the stamp-mills all day long and its eyes sometimes smart with the fine white choking dust which is loosed in the crushing of the ore.

Johannesburg is a fair counterpart of almost any large American mining town. It has broad straight streets, and many handsome edifices which house mining offices, the stock exchange, churches, schools, a university, and clubs. But it is not a "boom town"; it is a city founded upon a rock. Mining engineers have determined the existence of a gold "reef" 61 miles long and apparently limited in depth only by man's ability to undertake mining operations in the deepest levels.

Founded late in 1886, following the discovery of the Rand gold reef in 1885, Johannesburg has grown with spectacular speed. At first a part of the independent Boer republic of the Transvaal, after the Boer War (1899–1902) it became a part of the Union of South Africa, under the British flag. Its population of nearly 250,000 makes it the largest city in South Africa. More than half are whites.

JOHN, KING OF ENGLAND (1167–1216). Vicious, shameless, ungrateful, King John holds the title of the worst king that ever ruled England. Yet the very excesses of his reign proved in the long run a blessing to the nation, by provoking such violent opposition that his subjects rose against him and forced him to put his seal to the document which became the bulwark of English liberty, Magna Carta.

John was nicknamed "Lackland" because, unlike his elder brothers, his father, King Henry II, at first gave him no possessions on the Continent; but later he was endowed with castles, lands, and revenues on both sides of the channel. John showed his characteristic ingratitude by joining his brother Richard the Lion-Hearted in conspiring against their father, and it was the discovery of this treason that brought the old king to his grave. When Richard became king he confirmed John in his possessions and added others; but John again conspired during Richard's absence on the Third Crusade.

The Barons Choose John as King

On Richard's death in 1199 the barons chose John to be king, despite the claim of his nephew Arthur, the son of another brother, Geoffrey, who had died some time before. Two French provinces took up arms in young Arthur's support, but he himself fell into the king's hands and died soon after, undoubtedly murdered by John's command. In the war which followed, on other grounds, with the king of France, John lost all his French possessions except Aquitaine.

Then came a quarrel with Pope Innocent III over the nomination of Stephen Langton as Archbishop of Canterbury. John resisted the pope's choice, and in the struggle he was excommunicated and the nation was put under an interdict; that is, all religious services were forbidden except baptism and extreme unction. John's resistance was broken at last by the pope's threat to depose him and by the growing disaffection of his subjects. He not only received Langton as archbishop, but he abjectly agreed to hold England as a fief from the pope and to pay a yearly tribute. While John was absent on the Continent, seeking to regain his forfeited fief of Normandy, the barons of England united to resist the tyrant's rule. They mustered a powerful force and with the encouragement of Archbishop Langton marched against the king demanding a charter of liberties. Deserted by all but a handful of mercenary followers, John wrathfully recognized his powerlessness, met the barons at Runnymede on June 15, 1215, and put the royal seal upon the Great Charter (*see* Magna Carta).

But John had no intention of abiding by his grant and sought the pope's aid to free him from his oath to support the Charter. He raised an army and harried with fire and sword the estates of the barons, who in despair offered the crown to Louis, the son of a French king. Louis landed with a great army, and received the submission of a large part of England. In the midst of the war, while the issue was still doubtful, John died of a fever—caused, it is said, by eating too heartily of green peaches and new cider—leaving to his nine-year-old son, Henry III, the task of restoring the distracted kingdom.

The STORMY CAREER *of* ANDREW JOHNSON

The Tailor's Apprentice who Became President—How, in the Bitter Politics of a Border State, He Fought to Keep the Union from Breaking and Later Fought with Congress as to the Best Policy in Putting It Together Again

JOHNSON, ANDREW (1808–1875). "I have filled every office in the country from the position of the lowest alderman in your city to President of the United States." This was the proud boast of Andrew Johnson, the 17th president of the United States. The words show two important characteristics of his career—his wonderful rise from obscurity to power, and the unbounded egotism which led him continually to boast of his success.

Unlike Lincoln, Johnson constantly referred to his humble origin. Lincoln never mentioned his early life unless it was absolutely necessary for him to do so. Johnson never missed an opportunity to refer to the fact that his family belonged to the "poor whites" of the South. His father died when he was four years old, and at the age of 10, Andrew was apprenticed to a tailor in Raleigh, N.C., so that he might learn to make his own living. He had never gone to school a day in his life, but while working as an apprentice he decided to learn to read. A gentleman frequently visited the tailoring shop where he worked and read to the employees speeches of British statesmen. Young Johnson was so interested in these that the man gave him the book, and with the aid of his fellow-workers he learned to read the speeches for himself. After he was married and had started in business for himself at Greeneville, Tenn., his wife taught him to write and to do simple problems in arithmetic.

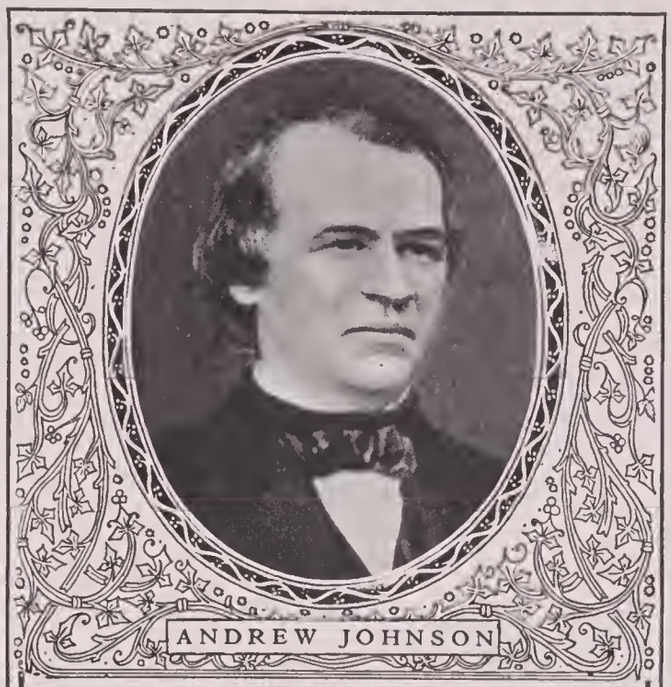
At the age of 20, Johnson began his political career in the humble position of alderman of Greeneville. He was elected to the office as the workingmen's candidate, in opposition to the slaveholding aristocracy of the town. From this time on, until 1843, he served almost constantly as alderman, mayor, or member of the state legislature.

In Congress, where he served from 1843 to 1853, as in local offices, he still represented the interests of the common people. In 1845 he introduced the first "homestead bill," to give landless citizens farms from the public lands. The bill was defeated by the slaveholders of the South, because it would mean eventually more free states in the Union; but the issue was brought up again and again, until it was finally passed in 1862, after the secession of the slave states.

The aristocracy of the South not only opposed Johnson's homestead policy, but they also despised the man because he had worked with his hands. He is probably the only man in the South, before the Civil War, who having done manual labor for a

living still won the proud positions of state governor (1853–55) and United States senator (1855-62).

When secession came in 1860–61 Senator Johnson attracted the attention of the North by his arguments for the Union, and he was the only Southern senator who did not resign and go with his state. In the border states the feeling between the Unionists and Confederates was more bitter than any place else. Johnson's work for the Union in Tennessee, and his acceptance of the position of military governor in 1862, shows his great physical courage, as well as his loyalty. He organized the part of the state which was under control of the Northern forces, and began the work of reconstruction, in which he was destined as president to play a prominent part.



ANDREW JOHNSON

JOHNSON'S ADMINISTRATION
(April 15, 1865–1869)

Amnesty Proclamation, with 14 classes excepted (1865).
Civil Rights bill passed over President's veto (1865).
14th Amendment ratified (1866).
Cable to Great Britain completed (1866).
Reconstruction bill passed over veto (1867).
Nebraska admitted (1867).
Tenure of Office bill passed over veto (1867).
Alaska purchased from Russia (1867).
French forced to quit Mexico (1867).
President acquitted on Impeachment trial (1869).
15th Amendment ratified (1869).

In recognition of his work for the Union, and to secure the votes of the war Democrats, to which party Johnson belonged, the Republicans in 1864 nominated him for vice-president on the ticket with Lincoln.

When Johnson was called to the presidency by the assassination of Lincoln, in 1865, he was confronted by the most difficult situation a president ever had to face. The war was over, but the ravages of the conflict were still to be repaired and the Union restored. The bitterness of the people of the North was increased by the death of Lincoln, for which they held the South responsible; and a triumphant majority of both houses of Congress were demanding harsh measures against the defeated states.

It was a situation which would have taxed the great powers of Lincoln and it exceeded those of the former vice-president. With all his ability and honesty, Johnson had never made good the defects of his early training. He was tactless, lacking in good taste, boastful, given to abusive speech, and fond of quarreling; while the leaders of Congress were men with whom Lincoln would have been forced to differ.

At first many leaders of Congress thought that "the accession of Johnson to the presidency would prove a godsend to the country." They felt that Lincoln would have been too merciful to the Southerners, and that as Johnson had always been bitter towards the "rebels," the country would be safer in his hands. Senator Wade, of Ohio, when congratulating Johnson, said to him: "Johnson, we have faith in *you*. By the gods, there will be no trouble now in running the government."

During his first weeks in office Johnson seemed to justify their faith. He loudly proclaimed that "treason must be made odious, and traitors must be punished and impoverished." But suddenly he changed his attitude and adopted the merciful policy of Lincoln, with infinitely less chance of success.

Before Congress met in December he had recognized state governments in all of the seceding states which had not been reconstructed under Lincoln. Congress refused to admit members from these states, and proceeded to ignore Johnson's acts and to lay down a far more severe policy for the treatment of the South.

The struggle which followed between Congress and the President was the most exciting event of Johnson's administration. The President was a firm States' Rights Democrat, and as such he vetoed the bill establishing the Freedmen's Bureau to protect the recently emancipated slaves, and the Civil Rights bill granting them the rights of citizens and placing them under the protection of the United States courts rather than state courts. Congress passed the bills over the President's veto, and then proposed amendments to the Constitution giving negroes the civil rights and the right to vote, at the same time taking this last right away from great numbers of white people in the South who had taken part in the rebellion. The ratification of these two amendments, the 13th and 14th, was taken to show that the people of the North approved of the Congressional policy of reconstruction.

This was also demonstrated in the elections of 1866, when Johnson appealed to the people to send men to Congress who would uphold his policy. He

made a tour through the country—known as his "swing around the circle,"—during which he spoke bitterly of Congress; but he lost support, rather than gained it, by his personal abuse of his opponents.

In 1868 the quarrel between Johnson and the partisan leaders in Congress came to a head, when the President sought to remove Edwin M. Stanton as his Secretary of War, to make room for General Grant. This was in violation of a Tenure of Office Act passed by Congress in 1867 to tie the President's hands. Stanton resented removal and the Senate upheld him. The high-handed majority in Congress then determined to remove President Johnson himself by impeachment proceedings. The grounds of the charges were admittedly political. The vote in the Senate, which acts as the court of trial in impeachment proceedings, stood 35 for removal and 9 against it. As 36 votes—two-thirds of the members—were necessary under the Constitution for removal by impeachment, Congress could do nothing but permit Johnson to serve out his term.

The Trouble over Mexico

The bitterness of the struggle over reconstruction and the disorders of the carpet-bag governments in the South blinded the people to an important development in international relations. During the Civil War the French emperor, Napoleon III, had placed Maximilian of Austria on the Mexican throne and kept him there by means of a French army. For a time the United States was too busy with its Civil War to do more than protest against this violation of the Monroe Doctrine; but in 1867 President Johnson forced the French to withdraw. Maximilian of Austria was then captured and shot to death by the Mexican patriots.

Another international development was the purchase of Alaska in the same year—bought from Russia for $7,200,000 on recommendation of Secretary of State Seward. As gold had not yet been discovered in that region, and as most people looked upon Alaska as merely a cold barren waste, they thought this was a bad bargain and contemptuously referred to it as "Seward's folly."

Partisan feeling for a time blinded people to the good points in Johnson's policy. Today we can see that it was wiser than that of Congress, and that much of the hostility between the North and South might have been averted if he had been able to persuade Congress to agree with him.

The first indication of a change in feeling toward the ex-President came in 1875, when, after several unsuccessful attempts, Johnson was again chosen a member of the United States Senate. But he died a few months after his election, and so did not have a chance to fulfil the prophecy of the *New York Herald*, that he would be of more use to the country in the Senate than he was in the presidency.

JOHNSON, SAMUEL (1709–1784). As a boy in Lichfield, England, where he was born, Johnson gave early promise of the powers of mind which were one day to make him the literary dictator of his times. He "gorged," as someone has said, the books in his father's bookshop. The days of his early manhood however were filled with disappointment and failure. His father lost most of his money, and the son found that the family poverty made it impossible for him to continue his studies at Oxford and take his degree. He fell in love and married at the age of 26, and with the aid of his wife's small fortune set up a school for young gentlemen near Lichfield. But the school failed after a year or two, and Johnson set off for London to seek his fortune. With him went David Garrick, his favorite pupil, who was to become the greatest actor of his times.

The early days in London were so full of hardship that years later Johnson is said to have burst into tears on recalling them. He reported parliamentary speeches, taking care as he frankly said "that the Whig dogs should not have the best of it." He made translations for the press, his knowledge of Latin and Greek serving him well. He made catalogs for booksellers, one of whom he knocked down for reproving him for negligence. Hard as Johnson worked, he just barely made a living for himself and his wife. Often he walked the streets at night for the want of a few pence for a lodging. But even in those pinching times, he would put pennies into the hands of poor little children sleeping in the streets. For all his bruskness, he was always gentle of heart.

The Famous Johnson Dictionary

Gradually Johnson's reputation grew; he became well known to the publishers and booksellers of London. One of them, Robert Dodsley, suggested that an English dictionary would be well received by the public. Johnson had already dreamed of such a work, and when a combination of booksellers offered him a considerable sum for the undertaking he accepted. The amount (about $7,800) seems large at first thoughts, but when one considers that the 'Dictionary' took almost eight years to complete, and that Johnson had to pay his assistants out of his own pocket, one can see that he was not yet free from money worries. Nowadays, Johnson's 'Dictionary' seems old-fashioned and unscientific; it was however far better than those which preceded it and paved the way for the better ones which we have. The personal note seems amusing to modern readers. Thus Dr. Johnson often permitted his own experience and his own intense prejudices to color the definitions he wrote. Some of these follow:

Excise. A hateful tax levied upon commodities, and adjudged not by the common judges of property, but wretches hired by those to whom excise is paid.

Grubstreet. Originally the name of a street in Moorfields in London, much inhabited by writers of small histories, dictionaries, and temporary poems; whence any mean production is called *grubstreet.*

Lexicographer. A writer of dictionaries; a harmless drudge, that busies himself in tracing the original, and detailing the signification of words.

Pension. In England generally understood to mean pay given to a state hireling for treason to his country.

The 'Dictionary' brought Johnson such fame that the University of Oxford conferred upon him the degree "Doctor of Laws" (LL.D.). But it did not bring him much relief from poverty. In the 18th century men were often given pensions in recognition of literary work or as a mark of political favor. In 1762 the government decided to bestow a pension of $1,500 a year upon Dr. Johnson. The author of the 'Dictionary' was rather hesitant about accepting the money. Had he not defined pension in his own pages as "pay given to a state hireling for treason to his country"? Had he not defined patriotism as "the last refuge of a scoundrel"? The prime minister, Lord Bute, reassured him, saying the money was given him for what he had done, not for what he was to do.

THE GREAT DOCTOR AND HIS BRILLIANT FRIEND



The big man taking snuff is the great Doctor Johnson, and walking beside him is his brilliant friend, Goldsmith. When the Doctor wrote, his style was big and heavy, like the man himself, and Goldsmith once said to him: "Doctor Johnson, if you could make little fishes talk, they would talk like whales." Perhaps that's what Goldsmith is saying to him now.

When Johnson had first come to London he had found dinners for sixpence, and coffee houses where by paying threepence he spent long hours talking to his friends. Good company and good dinners he loved more than anything on earth. "I look upon a day as lost," said he, "in which I do not make a new acquaintance." He ate enormously of such dishes as roast pork or veal pie stuffed with plums and sugar. His tea-pot held two quarts, as well it might, for he boasted of having drunk 25 cups at a sitting. To take dinner with Dr. Johnson in one of the London taverns—often in the Cheshire Cheese, which is still there—and to hear his brilliant, witty table-talk was considered well worth while. Thus grew up his famous Literary Club, which included Garrick the great actor, Reynolds the artist, Gibbon the historian, Sheridan, and Goldsmith, whose writings live today while most of Dr. Johnson's are forgotten, and others. There were women, too, who enjoyed an evening of conversation with the great man. They could hear him talk at the home of Henry Thrale, a wealthy London brewer, who was always a generous friend to him. There he met "little Burney" (Fanny Burney) who wrote 'Evelina', and there he formed the friendship with Mrs. Thrale which was to mean so much to him.

Today few people read Johnson's books because he wrote in a learned and ponderous style—often jokingly called "Johnsonese." Even in his own time the wags said that the "hard words were used to show how necessary was a large folio dictionary," such as he himself had written. Goldsmith once said to him: "Dr. Johnson, if you could make little fishes talk, they would talk like whales." No one is likely, however, to lose sight of him. He has been made too impressive and interesting a character to us through Boswell's 'Life'.

A Writer Greater than All He Wrote

In 1763 James Boswell, a young Scotch lawyer, met Dr. Johnson and became his admirer and friend. No words of his idol escaped him. He put them all down on paper and published them for the world to read after Johnson's death. And they are well worth reading; Dr. Johnson might be ever so involved and Latinistic in writing—in conversation he was pithy and colloquial. We hear him say: "Being in a ship

is like being in jail with the chance of drowning," which is as simple as one could make it. We see him as the tender-hearted friend, the generous alms-giver, for in the last years of his life he used his pension mainly for the poor. We see his sturdy independence of thought and his stubborn prejudices. Boswell records such gems as: "While you are considering which of two things you should teach your child first, another boy has learned them both"; and "Life is a pill which none of us can bear to swallow without gilding"; and "It is better to live rich than to die rich." In spite of the fact that the 'Dictionary' is now only a literary curiosity, and that no one today reads his essays or criticisms, Johnson, the man, will live on. Boswell's 'Life' will still preserve for us the picture of this strange, uncouth, great-hearted man—so eccentric that his grimaces, gestures, and mutterings often terrified people who did not know him, so oddly minded that at times he could not pass through a street without touching with his fingers every post in it, so learned and brilliant in his talk that the proudest and best were glad to gather at his feet.

Johnson's chief works aside from his 'Dictionary' were: *Poems*—'London' (1737) and 'The Vanity of Human Wishes' (1749); *drama*—'Irene' (1737); *essays*—'The Rambler' and 'The Idler' (1758–60); *novel*—'Rasselas' (1759); *criticism*— 'Lives of the Poets'.

JOLIET (*zhō-lyā'*), LOUIS (1645–1700). When Jacques Marquette was an eight-year-old lad, in Laon, France, there was born in the little frontier village at the foot of the rock of Quebec in Canada a boy whose name—Louis Joliet—became forever linked with his own in the French discovery of the Mississippi River.

Like Father Marquette, Joliet intended to become a priest. But after he had studied at the Jesuit College in Quebec, he abandoned this intention, and became instead a fur-trader and explorer. He was selected by Count Frontenac, governor of Canada, to go with Marquette in 1673 to explore the western country and push on to the Mississippi. (For an account of the exploration *see* Marquette, Jacques.) On his way back to Quebec, Joliet's canoe was upset and all of his maps and papers were lost, so that the only accurate report of the expedition is Marquette's. The information obtained by the expedition proved of material assistance to La Salle, who was largely guided by it when he explored the Mississippi to its mouth in 1682. (*See* La Salle.)

In recognition of his services Joliet was given the island of Anticosti in the Gulf of St. Lawrence, and later the seigniory of Joliet, south of Quebec, which is still in the possession of his descendants.

JOHN PAUL JONES — *Born Fighter*

The Earliest of America's Great Naval Captains, this Son of a Poor Scotch Gardener Cast His Fortunes with the Colonists and Became One of the Most Daring and Successful Commanders that the Sea Has Ever Known

JONES, JOHN PAUL (1747–1792). "This man was born a captain." These words were originally applied to a French general of the 17th century, but they have been used with equal truth to characterize John Paul Jones, the first naval hero of the United States. Jones was also a born fighter, as is shown by his famous expression: "I do not wish to have command of any ship that does not sail fast, for I intend to go in harm's way."

His whole life was a fight. From an obscure family, with meagre advantages, he fought his way up until before his death he was one of the most accomplished officers in the United States, and a man whom the greatest men of France and America honored with their friendship.

His father was a poor Scotch gardener, John Paul. The son was named for his father, and after he came to America he added the name of "Jones," probably because of his friendship with a well-known family of that name in North Carolina.

At the age of 12, John Paul became a sailor, going on his first voyage to America. The boy progressed rapidly in his chosen career. At 19 he was the chief mate on a slave-trading vessel, an occupation which was considered perfectly honorable in that day, but which filled him with disgust. At 21 he was captain of a trading vessel, but in 1773 he left the sea and settled in Virginia on a plantation which he had inherited from his brother William, who had emigrated to America years before while John Paul was still a boy.

At the outbreak of the Revolution Jones journeyed to Philadelphia to offer his services to his adopted country in its struggle for independence. Before Christmas he raised the pinetree-and-rattlesnake flag on the first American man-of-war. In 1777 he floated the newly adopted Stars and Stripes from the *Ranger*, and carried to France the news of Burgoyne's surrender. While in harbor in France he received from a French man-of-war the first salute ever given by another nation to the American flag.

From France he sailed to the western coast of England, destroyed the shipping at Whitehaven, and defeated the guardship *Drake* in the English Channel. Returning to France, then an ally of America, he asked for, and finally received, a naval vessel which he named the *Bonhomme Richard* in compliment to Franklin, the American minister to France whose *Poor Richard's Almanac* was very popular at that time. With this vessel Jones fought the famous battle with the *Serapis* on Sept. 23, 1779. After several hours of such fighting as had rarely been seen

on the seas, the English commander called upon Jones to surrender, but although his ship was sinking, that intrepid commander responded, "I have not yet begun to fight," and in a short time he compelled the English to surrender to him. For this victory Jones received a gold medal from Congress. It was richly deserved, for such victories were gained where England was strongest—on the sea—and they threatened her commerce and the flow of supplies and troops to her armies in America.

After the Revolution Jones entered the Russian navy. But he soon tired of the court intrigues, resigned his commission, and retired to Paris, where he spent the rest of his life. He was buried in a little Protestant cemetery in that city, but in 1905 his body was brought to America, and interred at the United States Naval Academy at Annapolis, Md. Thus after more than a hundred years of neglect his adopted country paid fitting honor to the memory of this man who ranks with Farragut and Dewey as one of the great captains of the American navy.

JOHN PAUL JONES



This statue of the famous naval hero is in Washington.

JOSEPHINE, EMPRESS OF THE FRENCH (1763–1814). The proudest monument in the island of Martinique in the French West Indies is the statue of a woman. It is that of Josephine Tascher de la Pagerie, a native of Martinique, who was raised by the genius of her second husband, Napoleon Bonaparte, to the position of Empress of the French.

When Madame de Beauharnais, as a widow with two children, married Bonaparte, he was an unprepossessing and little-known artillery officer. She gave him a social acquaintance which he had not had before, for she was a conspicuous figure in Parisian society. By cleverly pretending to hold republican principles, she had barely escaped the guillotine on which her first husband, General Beauharnais, had perished during the Reign of Terror. Thereafter she made her way by use of her wits and charm. It was with reluctance that she was induced to marry the rising young commander, who then was desperately in love with her. Within ten years he had made her Empress of the French, a position for which she was fitted by the charm and graciousness which concealed a very limited education.

Napoleon's love, however, cooled, and in addition she failed to bear him children. In 1809, in spite of her tears and entreaties, she was forced to consent to a divorce. Napoleon wished to secure an heir to his throne and to ally himself with the royal families of Europe, and soon afterwards he married Marie Louise of Austria. The title of Empress of the French was left to Josephine, however, and she was given the castle of Malmaison near Paris. There she died in 1814, less than two months after Napoleon's first abdication.

Her two children by her first marriage were Eugene and Hortense. Eugene proved an able and loyal general under Napoleon and was for a time viceroy of Italy. Hortense married Napoleon's brother, Louis, king of Holland, and became the mother of Napoleon III.

JUDAS TREE. Several species of these trees, on one of which the traitor Judas Iscariot is said to have hanged himself, are to be found in Europe and America. The small clustering reddish-purple flowers, which appear in early spring before the leaves, give it also the name "red-bud." It blooms at the same time with the dog-wood, with which it is frequently found, glorifying the somber woodlands with patches of color. Both the European and American species have a dark-veined wood, which takes a fine polish. Scientific name of the common American Judas tree, *Cercis canadensis.*

JUGO-SLAVIA (*yū'gō slä'vi-ȧ*). "The kingdom of the Serbs, Croats, and Slovenes" is the official title of this new state born out of the World War of 1914–18. Jugo-Slavs means simply "South Slavs," and is used to distinguish these peoples from the Russians, Poles, Czechs, and other Slavic nations who live farther north. The new state comprises the former kingdoms of Serbia and Montenegro, together with certain parts of former Austria-Hungary, Bosnia-Herzegovina, Croatia, Slavonia, Carniola, and half of the Banat, a region in Hungary north of the Danube.

The peoples of these lands are all of the same racial stock and their languages are closely related. The Serbs, however, use the Cyrillic alphabet, founded on the Greek, as do their Russian kinsmen, and also resemble the latter in belonging for the most part to

the Greek Orthodox church, though Mohammedans also are numerous. The Croats and Slovenes, on the other hand, use the Roman alphabet of western Europe, and are mainly Roman Catholics. Separated by more than a thousand years of history, these peoples were through the World War of 1914–18 reunited into a single nation. King Peter of Serbia became the head of the new state, but many details of government remained to be settled, and the early years were vexed by the question of Fiume and relations with Italy.

The country as a whole is mountainous and a large part of it is covered with forests. Wheat, barley, oats, maize, rye, beets, plums and other fruits, silk, and tobacco are the leading products. Hogs fatten on the nuts of the beech and oak trees that grow on the hillsides, and cattle, sheep, and goats graze on the higher slopes of the mountains. There are considerable mineral resources, including coal and lignite, iron, copper, gold, and quicksilver. The Danube River makes possible trade with Austria, Hungary, and Rumania, and there are railroad connections with Constantinople, as well as with points to the northwest. The area is about 95,000 square miles and the population, 11,000,000. (*See* Balkan Peninsula; Belgrade; Fiume; Montenegro.)

A SLOVENE WOMAN



The costume of the country people of Jugo-Slavia is picturesque as well as serviceable. This young farmer's wife is in her everyday working clothes.

JULIUS, POPES. The first pope of this name, JULIUS I, SAINT (Pope, 337–352), ruled the affairs of the church in the difficult days of the Arian heresy, when the Eastern emperors were persecuting the bishops who held fast to the creed adopted at Nicaea in 325.

JULIUS II (Pope, 1503–1513) was a member of the della Rovere family, and is remembered equally for his wars to secure and enlarge the papal states, and for his munificent patronage of Raphael, Michelangelo, and other artists of the Renaissance. Under the first head he drove Caesar Borgia out of Italy; and entered into the League of Cambrai (1508) and then the opposing Holy League (1511) with European sovereigns, and even led his armies in person to advance his warlike plans. On the other hand he was a most liberal and energetic patron of art in that time when supreme artists flourished. He tore down the old basilica of St. Peter's to make room for the present one; and for him Raphael and Michelangelo did some of their best work. His successor, Leo X, continued the work of encouraging art and literature.

JULIUS III (Pope, 1550–1555) was less distinguished, but was closely connected with the work of the Council of Trent and sought to aid the Queen of England in restoring that land to the Catholic fold.

JULY. This is the seventh month in the year in our calendar, and the fifth in the Roman calendar, whence it was called *Quintilis* (the fifth). It was later named July in honor of Julius Caesar. The "July Revolution" is that of France in July 1830, by which Charles X was set aside and Louis Philippe became king.

JUNE. Three Roman origins have been suggested for the name of this month—in honor of the goddess Juno, the queen of heaven; from the Latin word which means "to join"; and from *juniores*, the young people as opposed to the older ones, to whom some say it was dedicated. Any of these origins seem reasonable enough, for it is the queen of months, since "then if ever come perfect days." It is the month of weddings, and the tides of youth beat fullest and strongest in the veins of men and nature when we are "knee-deep in June." The summer solstice occurs in June (*see* Equinox and Solstice). Before Julius Caesar reformed the calendar June had only 29 days; he added the 30th.

JUNE BUG. If you sit in a lighted room with open windows on a late spring or early summer night, you are almost sure to hear before long the buzzing and bumping of a heavy-flying insect against the ceiling and walls. Presently the visitor will fall to the floor with a thud, and you find a dark-brown beetle about an inch long lying on its back kicking and struggling awkwardly to get on its feet. This is the "June bug" or "May beetle," a member of the scarab beetle family, and a pest.

Although the adult beetles do much damage by eating the leaves of trees and shrubs, it is the larvae or young that are especially harmful. They are white "grubs" as large as the end joint of a man's little finger, with brown heads, that live in the ground for two years or more, and devour the roots of grass and plants. Strawberry beds suffer particularly.

The best way to get rid of the larvae or grubs is to make a weak emulsion of kerosene soap and filter it into the ground. The adults can be killed by using lights to attract them into pans filled with pure kerosene. Scientific name of the genus, *Lachnosterna*.

JUNIPER. Peculiar among the conifers is the juniper, characterized by its berry-like seed cones, which cling tightly to the branches, their gray-blue coloring harmonizing with the dull green of the needle-like foliage. The branches grow irregularly, the branchlets shooting out at all angles. This very ruggedness is charming and causes the juniper to be prized as an ornamental tree, the Japanese especially cultivating these picturesque effects by pruning and training the limbs to fantastic forms.

There are about 30 species widely distributed in the cooler parts of the northern hemisphere. The best known species in the United States is probably the Virginia juniper, commonly called the "red cedar," which sometimes attains a height of 100 feet. Its fragrant heart wood is highly valued for cabinet work, moth-proof chests, and pencils. Its indestructibility under all weather conditions makes it valuable for fence posts. Though widely used as an ornamental tree the red cedar is looked upon with disfavor by the orchardist, because it is one of the hosts of the apple rust, so detrimental to orchards. Another species well known in the United States as well as in Europe is the common juniper (*Juniper communis*), a smaller tree, often a mere shrub. Its berries are used in Europe to flavor an alcoholic liquor called gin. There are several other species native to America commonly called cedars, though they have no connection with the true cedars, which are not native to America.

Scientific name of the red cedar or Virginia juniper, *Juniperus virginiana*. Bark reddish brown, separating into long shreds. Leaves minute, dull green, simple, opposite in twos or threes, stiff and sharp. Berries small, bluish-gray, erect in growth and clinging closely to the branches, containing 1 to 6 and sometimes 12 seeds.

JUNO. The chief Roman goddess, identified with the Greek goddess Hera (*see* Hera). She was the wife of Jupiter (Zeus) and the mother of Mars, and was looked upon especially as the deity of women and of marriage. The kalends (first) of each month were sacred to her, and she was worshipped with Jupiter in the great temple on the Capitol as "Juno Regina," queen of heaven. She also had a shrine as "Moneta," goddess of money. One of the minor planets between Mars and Jupiter is named for her (*see* Asteroids).

JUPITER. In the name Jupiter the syllable "Ju" comes from the same root as the Greek "Zeus," while the syllable "piter" is really *pater*, or "father." So Jupiter means literally "Zeus the Father"—the chief of the Greek gods of Mount Olympus. The famous temple of Jupiter at Rome stood on the Capitoline Hill. (*See* Zeus.)

The name Jupiter is also given to the largest of the planets, the fifth in order from the sun. It is curiously marked with belts, and has nine satellites or moons. It takes Jupiter more than 11 earth years to go around the sun. The pull of gravitation on Jupiter is so much stronger than on the earth that a body there weighs more than twice as much as it would on our planet. (*See* Planets.)

JURA (*jū'rȧ*) **MOUNTAINS.** The same geological force which crumpled the earth's crust and formed the magnificent and lofty Alps produced the low uneven Jura Mountains, on the border of France and Switzerland. These mountains cannot boast the grandeur and beauty of the Alps, and the area covered by them is but a small part of that of the Alps. The highest elevation, Mount Reculet, is only 5,643 feet, and the average height is only about 2,600 feet. The Jura range is about 156 miles long by 38 miles broad, and extends from southwest to northeast from the elbow of the Rhine to the elbow of the Rhone. Excepting in its central portion the range is cut by many deep, sharp, cross-ravines and valleys. The westward side of the mountains descends by gentle slopes to the fertile plains of France, but the eastern side is precipitous, and its foaming streamlets dash down to the rocks to feed the placid waters of Lake Geneva and Lake Neuchâtel.

At the extreme north end of the range is the famous Belfort Gap, a broad pass in the low rolling hills between the Vosges and Jura Mountains. This pass may well be called the "front door of France," for it opens on the most beautiful, fertile, and prosperous section of the country and is the great highway between eastern France and central Europe. In 1870–71 this was one of the roads by which Germany invaded France, but in the World War of 1914–18 this route was not attempted. For all its apparent accessibility this pass would have proved a trap for an enemy horde attempting to march through it, because it is now strongly fortified.

The peasants pasture their flocks on the grassy uplands of the Jura and some farming is carried on, mostly wheat-raising. Mining is of little importance. The mountains are more sparsely wooded than the Black Forest, though the southwest section is famous for its wooden toys manufactured from the boxwood which grows in the mountains. Flourishing little cities have been built on the slopes of the mountains and their prosperous inhabitants busy themselves with the manufacture of watches and spectacles among other things. The climate throughout is cold and damp in winter, and except in scattered watering places, few tourists visit the region.

JURY. In an inclosed space at the left of the judge in the court-room sit the 12 men of the jury. They listen to the evidence given by the witnesses, to the summing up of the case by the lawyers, and to the judge's instructions to them on the law and the evidence in the case. Then they retire to a private room where they are locked in and guarded. The judge may keep them there as long as he thinks there is a reasonable hope for their agreeing. When they return to the court-room usually they have all agreed, and the fate of the prisoner depends upon the verdict of "guilty" or "not guilty," read by the *foreman*, whom they have chosen. If they have not agreed they are dismissed and a new trial is held before another jury.

In all criminal cases an acquittal is conclusive. If, however, the evidence is clearly insufficient to establish guilt, the judge may direct a verdict of not guilty, or, after a verdict of guilty, may grant a new trial if it appear that legal error was permitted in the conduct of the case. In criminal cases the jury's verdict must be unanimous.

Such a jury is called a *petit jury* or small jury because it has only 12 men; indeed, in some states, in civil cases and in minor criminal cases before a justice of the peace, there may be less than 12 jurors.

A TRIAL IN THE DAYS OF KING ALFRED



This famous picture by C. W. Cope portrays an Anglo-Saxon institution which bore a marked resemblance to the modern grand jury. The twelve senior "Thegns" of a district were appointed to hear the charges against any man accused of a crime and determine whether the evidence warranted holding him for a test of his guilt or innocence by compurgation or by ordeal.

The work of the *grand jury* comes before that of the petit jury. It is its duty to decide, after hearing in secret the preliminary evidence against a man, whether the state shall accuse him of a crime and hold him for trial. This grand jury, or great jury, usually has 23 members, though the number varies in some states, at times being only 12. Whatever the number on the grand jury, 12 members must agree. If they think from the evidence they have heard that the accused is probably guilty, they *indict* him or "bring in a true bill," and then he is tried by a petit jury. Cases usually come before a grand jury as a result of activity by the police, sheriff, coroner, or state's attorney. But they may start investigations on their own motion or at the suggestion of a judge.

The men who are eligible to serve on trial juries are selected by lot. The names of citizens eligible for jury service are placed in a locked box and drawn out as needed. When a man's name has been drawn he is summoned to serve by the sheriff. If it is a criminal case he is closely questioned in open court by the opposing lawyers. If he is acceptable to both sides he is passed, but if his answers show that he is prejudiced or has fixed opinions on the guilt or innocence of the accused, or objects to the penalty that may be inflicted, death for instance, he is excluded "for cause" by the judge. Each side also has a right to exclude a limited number without giving their reason —that is, the defense or prosecution has a certain number of "peremptory challenges."

Besides the petit and grand juries there is also the *coroner's jury*. This is summoned by the coroner in case of a sudden or violent death to decide whether the death was due to murder, suicide, accident, or natural causes, and therefore whether some person under suspicion of causing the death should not be held for further investigation by the grand jury.

In civil cases—that is, in controversies between individuals—juries are widely used to decide questions of fact. The judge applies the law to the facts as the jury finds them to be, and renders judgment. Under certain circumstances the judge can direct a verdict, or if a verdict is manifestly improper, he can set it aside. Usually juries in such cases are not confined during the trial, as they are in important criminal cases.

The right of trial by jury is one of the most cherished rights of the Anglo-Saxon nations. The 13 colonies gave as one of their grievances in the Declaration of Independence that the king had deprived them, in many cases, of trial by jury. When the Philadelphia Convention drew up a constitution for the United States in 1787, it provided that in federal

courts there should always be a jury in criminal cases, and in civil cases when the amount in dispute is more than $20. The state constitutions have similar provisions for state courts.

Of all of our institutions—legislatures, courts, etc.—the jury is one of the oldest and its development one of the chief gifts of England to the rest of the world. The Normans made use of the most primitive form after they conquered England in 1066. But the men who served at these "inquests," as they were then called, must know the facts themselves instead of learning them from witnesses. This sworn inquest was used chiefly by the king in transacting the business of the kingdom, but represented also an important participation by the freemen in the most important matters of government. Not until the reign of Henry II in the 12th century did the jury come into more general use and only gradually were the jurors changed from those who decided on the ground of what they themselves knew to men who must decide solely on evidence that they heard in court.

Early Forms of Trials

But how, you ask, were the trials conducted when they did not use a jury? Well, in Anglo-Saxon times when a man accused of a crime could bring into court a sufficient number of his neighbors who were willing to swear to his innocence, he was released. In this trial by *compurgation* the number of compurgators needed depended upon the rank of the men who took the oath as well as upon the importance of the case. Then there was the trial by *ordeal*, which was really an appeal to God for a miracle to "make manifest the innocent and confound the guilty." In the ordeal by hot water or by hot iron, the accused plunged his hand into boiling water or carried red-hot iron a certain distance; if the hand healed in three days without pus, the accused was innocent. In the ordeal by cold water the accused was thrown in running water with hands and feet tied together; if he floated he was guilty, but if he sank he was innocent and must be quickly hauled out. Finally there was the trial by *combat*, or judicial duel, in which a man proved his case by defeating his adversary in battle. As late as 1817 a man in England appealed to the old forgotten law of trial by combat, which was still on the statute book. His accuser refused the challenge and the man was freed. But trial by jury had been in use for centuries before that, and nearly everyone had forgotten about this old law which was repealed the next year.

Jury trial introduced trial according to evidence and reason, in place of an appeal to superstition, chance, or force. It also marked an important stage in the development of the representative system, for these early jurors were chosen as representatives of their community, and so are a link in the chain which led up to Parliament.

JUSTIN'IAN I, EMPEROR OF EASTERN ROMAN EMPIRE (483?–565). To Justinian the world today owes a greater debt than to any other of the long line of emperors of the Eastern Empire, for it was through him that we received the Roman law in a usable form.

Justinian's parents were rude peasants, but through his uncle, Emperor Justin I, he received the best education that Constantinople afforded. For a time he was associated with his uncle in the government and at the death of the latter in 527 succeeded him as emperor of the Eastern Roman Empire.

Justinian's ambition was to restore the grandeur of the empire by legislation, by great public works, and especially by conquering the German kingdoms of the West. He had the rare faculty of choosing the most competent people for his helpers. His wife, the Empress Theodora, was a brilliant woman—though of somewhat questionable character,—who increased the splendor of the court while she tyrannized over the nobles and magistrates. She was charitable to the poor; and once in a riot between the Blue and Green factions in Constantinople, her firmness saved the throne for her husband, who was ready to flee. Also, in Belisarius and Narses the Emperor found commanders of remarkable genius, well qualified to lead in the great work of conquest. They subdued the Vandals of Africa and brought Italy under control.

As a builder Justinian filled every corner of his empire with churches, aqueducts, forts, and hospitals. The greatest of his buildings was the magnificent dome-covered cathedral of St. Sophia in Constantinople, his capital city. His people were unhappily burdened with heavy taxes to pay for all this magnificence. He left at his death an empire well on the way to decline.

Justinian was most noted, however, as the emperor who finally codified the Roman law in such form that it was handed down to later ages. Under his authority the lawyer Trebonian headed a commission which collected and compiled the 'Code', containing 12 books of Roman laws. This was followed by the 'Digest' or 'Pandects', a summary of the decisions of Roman lawyers and judges concerning these laws, and finally by the 'Institutes', a textbook for students of law. These writings together form the Civil Law (*Corpus Juris civilis*) on which is based the laws of some modern nations, including France and Italy, and of the state of Louisiana.

JUTE. The gunny-sack that holds your potatoes was once a mass of silky fibers in the stalks of jute plants growing in a hot moist field in India or some other semi-tropical country. When the stalks grew tall and bore their yellowish flowers, they were cut, stripped of their leaves, bound into bundles, and thrown into a stagnant pool. There they lay until the outer skin became soft and was easily separated from the tough fiber. Then dark-skinned natives, standing waist deep in the water, beat and washed the long fibers and put them to dry in the hot sun. The whole process is similar to that in the case of flax and hemp. Next the fiber of "tow" was pressed into great bales, and made a long voyage to the United States, where it was spun into jute yarn and woven into gunny cloth.

Some gunny-sacking or burlap is close and firm in texture, for bags that carry fine seeds and sugars; some is coarse and open, such as that used for your potatoes. Gunny cloth is used to wrap cotton bales, furniture for shipping, and in many other ways where coarse cloth is required. The fiber is also used for jute rope, cord and twine, and coarse paper. Jute takes dye readily and hence is woven into fiber carpets and curtains for artistic yet inexpensive furnishings. Its fine and silky character fits it for the false hair and wigs worn by actors. It is sometimes used as an adulterant in the manufacture of cotton, silk, linen, and woolen fabrics. Fine grades of burlap are often used in place of wall paper.

Compared with hemp, manila, sisal, or ramie fibers, jute is inferior in strength, tenacity, and durability, but because of its price and adaptability it holds an important place in the manufacturing world. India produces practically the entire world's supply of jute, for although it can be grown elsewhere Indian jute is cheaper because of the lower labor cost.

Jute plants are annuals growing from seed. Scientific names, *Corchorus olitorius* and *Corchorus capsularis.*

JUVENILE COURTS. The purpose of the juvenile court is to act as a sort of "big brother" to boys and girls who break the law, to show them the folly of rebelling against the regulations of society, to see that they have the right sort of home surroundings, and to check them before they become confirmed criminals. Although the system varies widely in different states, its general working plan is about like this:

The unruly boy or girl is taken before the juvenile court judge, after the facts have been investigated by some officer of the court. The judge talks in a friendly way to the offender and tries to find out what led to the crime or misbehavior. If it is a first offense, the boy or girl is usually "put on probation." This means that they must report each week or each month to a probation officer, who keeps track of their behavior. If the parents prove to be unfit, the child may be taken from them and put in some public or private institution. Boys or girls who are arrested repeatedly for serious offenses are sent to reform schools or detention homes. Parents of "delinquent" children, as young law-breakers are called, may be summoned before the judge and advised about better methods of handling them.

All this is done on the theory that the average boy or girl really wants to be a respectable citizen, that no one is born wicked, and that if you give children a chance by putting them on their honor, they will usually "make good." This faith in human nature has proved itself sound in many other experiments along the same lines. (*See* George Junior Republic.)

In former times, children were tried just like older criminals, sent to jails, and even executed. In the prisons they were associated with the lowest types of mankind, where they were likely to acquire worse habits than they had before. Later they were sent to reform schools instead of prisons, but they were tried in the same criminal courts, where they came in contact with an atmosphere of crime; and when they were set free they bore the ill name of "jail birds."

In 1869 the city of Boston started separate sessions of court for juvenile offenders and put a probation system into effect. The example was followed by some other cities, but it did not work out well, because there was lacking the essential "human touch" of specially selected judges. The first court entirely given over to children was opened in Chicago, Ill., in 1899 by Judge Richard Tuthill. Within ten years, 30 states had adopted this plan and today juvenile courts are found from coast to coast and in all the larger nations of Europe.

One of the most noted examples of this type of court is found in Denver, Colo., where Judge Ben B. Lindsey, one of the pioneers in the movement, has fought consistently to have all cases directly concerning children brought before the juvenile court. In the Denver court and many others a woman acts as assistant judge and deals with most of the girl offenders. (*See* Prisons and Punishments.)

K

KAFIR CORN. A variety of sorghum, native to South Africa and India, and now grown widely in the southwestern United States as a forage crop. It is particularly valuable in semi-arid regions where other grains do not readily grow. The juicy stem and leaves make excellent silage, while the grain, about the size of popcorn and growing in a thick bushy head containing hundreds of kernels, is used for stock-feeding and in poultry foods. The meal is sometimes used for human food. (*See* Sorghum.)

KALEIDOSCOPE. One of the most interesting of scientific toys is this ingenious instrument, which presents a beautiful ever-changing series of bright and colorful patterns. Since its invention by Sir David Brewster in 1817, it has given pleasure to millions. The simplest form is a tube about 12 inches long and three inches in diameter. Through this tube run three mirrors which are joined together at their edges, making a hollow triangle within the tube. At one end there is a little compartment which contains bits of glass of various sizes and shapes. The outer end of this compartment is clouded glass and the inner end is clear glass. At the other end of the outside tube is the eye-glass. When the tube is turned the colored bits fall into different positions and these, reflected over and over in the mirrors, make the designs. Various modifications of the kaleidoscope giving increased variety are used by designers of patterns for carpets, wall-paper, etc.

PERFECTLY COMFORTABLE!



This great Kangaroo looks as if he were puffing up to make a speech, but he's merely resting. His two hind legs and his thick muscular tail provide him with a nice easy-chair.

KAMCHATKA (*kăm-chăt' kă*). Shaped like a spear-head with a mountain rib running through the center, this peninsula of eastern Siberia stretches into the Pacific, between Bering Sea on the east and the Sea of Okhotsk on the west, for a distance of 750 miles. It covers an area of nearly 105,000 square miles—about the same as that of New England with Ohio thrown in—but the population is under 10,000. The summers are colder and the winters warmer than in southern Alaska, which lies in about the same latitude. The natives have characteristics of both the Mongolian race and the North Pacific Indians. Fishing and hunting constitute the chief occupations, and furs are the most valuable production. The peninsula contains many volcanoes, both extinct and active, one of the latter (Klutchevskaya, about 16,000 feet) being almost constantly active. Kamchatka was annexed to Russia at the close of the 17th century. In 1855 it was incorporated with the maritime province of Siberia.

KANGAROO. If you like to be surprised, just stand by the kangaroo pen in the park zoo awhile. If you are lucky, you will be surprised several times.

You are sure to wonder, at first, why there is such a very high strong fence of iron posts and netting around these queer-looking animals. No taller than kindergarten children, they sit upright as neatly as if on three-legged stools. You might say that they *are* three-legged stools, for kangaroos rest on two hind legs and a long fat tail. From these broad bases their bodies taper up in the oddest way to narrow sloping shoulders and small deerlike heads. Their full bright eyes glance about, their rabbit-ears stand erect, listening. In front of the breast the short fore-paws are drooped, as if they are there less for use than for ornament.

Sometimes the kangaroo drops on all fours and eats like a rabbit, hopping about on his hind legs like a robin. But it seems to be easy for him to pick up a carrot, hold it between his paws, and eat like a squirrel. The keeper knows what he is about when he scatters the food, putting some choice bits in the farthest corners of the pen. He does that so you can see the animals—*jump!*

There! That's surprise number one. When a kangaroo wants to go across his pen he doesn't waste time in walking. He just stretches up on his hind legs and leaps. It really must have been the kangaroo, and not the cow, that jumped over the moon and made the little dog laugh!

No wonder the kangaroo can jump so far and so high. He has the biggest and strongest hind legs, for

his size, of any animal in the world. His hind feet are so long it looks as if he were sitting on his hind elbows. At the end of the foot is the biggest of big toes. It is in the middle of the foot, and has on it a long, sharp, wicked-looking, dagger-like claw. On one side of this big toe is a small one. On the other side a pair of helpless little twin toes dangle from the leg. The kangaroo's hind leg, foot, and big toe are as wonderful, in their way, as the elephant's trunk.

A long, long time ago, when there were big fur-covered elephants on the earth, there were also kangaroos as big as hippopotamuses, with heads three feet long. Perhaps it was these huge jumping beasts that started the story of the giant who wore seven-league boots and could step over small mountains. An "old man" kangaroo six feet high of today can leap over a horse and rider, and then get away by jumping as fast as the horse can run.

These queer animals are found in only one place in the world—the big island continent of Australia and its neighbor islands on the other side of the earth. Living on grass, small plants, and the roots of herbs, they take the place of the deer and antelopes of other countries. Like other grass-eating animals they live in herds with leaders, and are naturally very timid and peaceable. There are about 50 species of kangaroos, belonging to 12 or 15 genera. The largest are as tall as a man, and weigh 150 pounds. The smallest are not as big as a rabbit. Some live on wide plains, some in the mountains; one of the most interesting species is the tree-climbing kangaroo discovered in Queensland. Like antelopes, kangaroos bound away at the slightest alarm. If overtaken and attacked, they will fight. The giant kangaroo can kill a man or a dog with one slash of the big-toe claw.

The most surprising thing about the kangaroo is the way the mother cares for her new-born babies. If you watch sharp, you may see two or three small heads appear from a curious pouch in the under side of the mother's body. It is a deep, flat, fur-lined pocket, and the mother kangaroo can shut the top as tight as your mama snaps the clasp of her shopping bag. She can open it, too, for the little ones to jump in and out.

Kangaroo babies need that pouch. When they are born they are less than two inches long—not half as large as mice—and blind, naked, and helpless. They cannot even suck their mother's milk, as kittens and puppies can. Their mouths fasten over the nipples inside the bag, and the mother *pumps* milk into them every so often. They live in the bag for months, scarcely moving. For a long time afterwards they sleep and travel in the pouch, leaving it to hop about and play, while learning to graze like their mothers. They do not leave the pouch permanently until they reach, in the larger species, a weight of 10 pounds.

Animals which are provided with such pockets for their young are called *marsupials*, from the Latin word for "pouch." In former ages marsupials were met with all over the earth, but today the 150 species are found chiefly in Australia. Besides the kangaroo, the principal marsupials of Australia are the bandicoot, wallaby, cuscus, opossum or phalanger, banded ant-eater, Tasmanian wolf or thylacine, Tasmanian devil, and certain pouched doglike and bearlike animals such as the koala and wombat.

Australian marsupials are particularly interesting because of the light they throw upon the processes of evolution. At one time marsupials were common in all parts of the world. But it is believed that in the course of ages, their cousins, the "placental" mammals whose young are born much more developed, gained the upper hand and exterminated the marsupials. Australia, however, had been cut off meanwhile from the rest of the world, so that the marsupials there went on undisturbed. Outside of Australasia, the only marsupials which now exist are the opossums, found in South America and the southern parts of the United States. The so-called "kangaroo rat" of the southwestern United States gets its name from its long kangaroo-like hind legs and not from any real relationship to the marsupials. Kangaroos form the family *Macropodidae*. (*See also* Australia; Opossum.)

KANGAROO ODDITIES



Young kangaroos have an easy time of it, being carried about in their mother's pouch, as you see.



Here you see how a kangaroo sits back "on his heels" when feeding, and grasps his food with his small front paws.

The "SUNFLOWER" STATE'S FERTILE PRAIRIES



Extent.—East to west, about 410 miles; north to south, 210 miles. Area, 82,158 square miles. Population (1920 census), 1,769,257.
Natural Features.—Low hills and rolling country, rising gradually from 750 feet in east to 4,000 feet in west. Principal rivers: Kansas (tributaries, Republican, Solomon, and Smoky Hill), and Arkansas.
Products.—Wheat, corn, cattle and hogs; slaughterhouse products, flour and milling products; coal and petroleum.
Chief Cities.—Kansas City (about 102,000); Wichita (73,000); Topeka (capital, 50,000).

KANSAS. The state line, says a Kansas writer, is one of the really great inventions of American civilization; it supplies separate "cold frames" in which experiments in democracy may be tried out. A Kansan certainly ought to know, for the rectangle between the 40th and 37th parallels was chopped out of the vast western plains as the Great American Experiment, a field in which the test was to be made to determine whether the New England conscience or "the peculiar institution" (slavery) was the hardier plant and the one best adapted to American soil (*see* Kansas-Nebraska Act). And Kansas has ever since been famous for its enterprises and fondness for experiments.

The "sunflower state" occupies the geographical center of the United States. Its rolling prairies are slightly uptilted toward the north and west. Here and there—especially in the west and south—they become mesas and tablelands broken by deep cuts, almost canyons. The meager streams are never navigable; the smaller ones often fail entirely in summer; yet the valleys are wide, and in Indian times they determined the course of tribal wanderings. The two great highways of transcontinental travel before the railroads were built, the Santa Fe Trail and the Oregon Trail, followed the course of river valleys across the future state of Kansas, and along their borders, wherever the white man disturbed the soil, sprang up the hardy Kansas pioneer, the sunflower.



Relative Value of Kansas' Products

Kansas has no mountains, no marshes (except a few salt marshes), and only a few small and shallow lakes, or rather ponds.

Probably its situation in the first place, rather than any geographical feature, decided that a great commonwealth should arise here. No one who reads crop reports or the newspapers today needs to be told that the rich dark Kansas soil—300 feet thick in some places—is fertile. Indeed, it is so rich that fertilizers find but a scanty market there, but early explorers believed these vast plains to be incapable of cultivation, and settlers long feared the fierce extremes of the midcontinental climate. Now that the prosperity of Kansas has become almost a proverb, people have found it difficult to explain the harrowing tales of grasshoppers and tornadoes, flood and drouth in the earlier troubled days except by supposing that tree-planting and soil cultivation have changed the climate. This, scientists tell us, is a mistake. The climate has not changed, but farmers have learned how to make use of existing conditions.

In the eastern part of the state the rainfall, averaging about 40 inches, is sufficient for crops, and the crops of a good year will make up for the poorer crops of an off year. The western end, where the rainfall is scanty—only about 15 inches—is underlain by a vast sheet of underground water. Here splendid crops of winter wheat, alfalfa, kafir corn, and sugar beets have been raised by irrigating with sub-surface water together with summer fallowing.

THE STATE WHERE ROLLING PRAIRIES YIELD FORTUNES



In its early days Kansas was considered almost a desert, and many stories were told of the appalling hardships endured by its inhabitants. One who visits the state now will wonder how such tales originated, for the farmers have made its prairie-land into one of the richest farming districts in the world. Trees are abundant, and the old Kansas "desert" now blooms like the rose.

There is perhaps no state where intelligence in farming is better rewarded than in Kansas, and none where intelligence is more absolutely necessary to success. This may be why the number of students in the state agricultural college is exceptionally high in proportion to the population of the state, and also why the state board of agriculture, which is organized on a non-political basis, is an exceptionally active body with a remarkably efficient system of crop-reporting.

The hard Turkey Red wheat for which Kansas is famous is descended from seed brought to the state during the 70's of the last century by Mennonite immigrants from the Crimea. It has proved to be especially well adapted to Kansas soil and climate, and makes a very high grade of flour. The state agricultural college by breeding thousands of strains of this wheat has evolved a variety which gives an even higher yield per acre than the old Turkey Red. So extensively is Kansas wheat used for "blending" with other kinds that it is said that almost every sack of high-grade flour produced in the United States contains some Kansas hard winter wheat.

Kansas stands now high, now comparatively low, among wheat states, according to the acreage planted and the weather for any given year. The state's record for the years 1918 and 1919 is a remarkable one, which deserves to be remembered for the difficulties under which it was achieved as well as for its contribution toward winning the war with food.

Two bad seasons (1916–17) had exhausted the resources of many farmers; the banks had made loans up to their legal ability to do so. The state board of agriculture early in the year found that the wheat acreage would be contracted in the fall unless aid were extended to the farmers, because those whose crops had failed were unable to purchase seed wheat. The board secured an appropriation from the president's special emergency fund for seed wheat loans, not only in Kansas, but also in Oklahoma, Texas, and New Mexico. With a loan of nearly $1,000,000 to spend for seed, Kansas planted over 10,000,000 acres—an area nearly as large as the land surface of Massachusetts and Connecticut combined—to winter wheat, and harvested in 1919 a crop of 150,000,000 bushels—the largest crop of any state in the Union that year—to

WATER FOR THE THIRSTY CROPS



In many parts of Kansas water lies very near the surface and helps to make up for "dry" seasons. Here a farmer has hitched a gasoline engine to an up-to-date irrigation pump, and gets all the water he wants for his crop. Irrigation and dry farming methods have made fertile many "arid" portions of the great plains of western Kansas.

WHERE KANSAS MAKES ITS LAWS



Here is the handsome state capitol in Topeka, where the Kansas legislature gives expression to the progressive ideas of the state. Kansas has long been known as a state of experiments, and is credited with many innovations such as "blue sky" laws, which were derided at first, but afterwards found general favor throughout the nation. Perhaps the state caught the innovating habit from the circumstances of its foundation, for from the first Kansas has been a battlefield of conflicting ideas—the sort of soil which history shows to be most favorable to growth and progress.

help feed the starving millions of the world that sent their plea to the United States for food when the nations laid down their arms.

Besides wheat, the principal crops raised in Kansas are corn, oats, rye, barley, hay, sorghum, and potatoes. The state is also a leader in broom corn. Grazing is an important industry, particularly in the western part of the state, where the insufficient rainfall makes cereal crops uncertain without irrigation. Kansas City provides an accessible market for beef cattle, and dairying is also carried on extensively.

"Crops" that Underlie the Farms

The chief minerals are fuels—coal, petroleum, and natural gas. The principal coal-producing region is in the southeast corner of the state, centering around Pittsburg. Petroleum and natural gas were first found in splashes running from northeast to southwest at the outer border of the coal region. The original territory has begun to be exhausted, but Kansas has now become one of the chief petroleum-producing states through the discovery of new oil fields a little farther west, at Eldorado and Augusta, just east of Wichita. These fields all form part of the Kansas-Oklahoma oil region. Kansas ranks among the six leading states in the production of zinc and salt. Gypsum, limestone, sandstone, lead, cement, and brick clay are other mineral products of some importance. Much of the brick and cement finds use in the construction of the fine roads for which Kansas is noted.

Lacking iron, Kansas uses only about a third of the coal it produces. The chief manufactures are slaughtering and meat-packing and the milling of flour and grist-mill products. Both of these industries are extensively carried on in Kansas City (*see* Kansas City, Kan.) and Wichita, the second manufacturing city of the state. Topeka, the capital, has large railroad-car shops and flour and grist-mills, and manufactures dairy products on a large scale. Leavenworth, a former "squatter town," now has important manufactures, including foundry works and brick yards. The manufactures of Lawrence, which suffered so much during the bloody border battles and which is now the seat of the state university, include flour, brick, and paper. Other manufactures of the state are portland cement, glass, and salt.

But agriculture is by far the greatest industry. There are no large cities, and three-fourths of the people live on farms. Kansas is one of the most purely American of states, more than 90 per cent of its population being American born.

A State that Does Its Own Thinking

The state has produced no great geniuses, yet there is sprinkled over it as a whole enough of the salt of difference—of nonconformity—to go far toward the seasoning of several geniuses. When Kansas has made up its mind, it doesn't care what the rest of the world thinks, and so it is not hindered by self-consciousness or fear of ridicule from putting into practice any unheard-of thing that Kansans believe is for the good of the community. Sometimes they have to undo what they have done and start over again, but Kansas farmers long since learned to plow up and plant over again, when necessary, without making any fuss about it. And it is rather surprising, after

A PARADISE FOR CATTLE



In addition to her great wheat farms, extending like green or golden seas to the horizon, Kansas has great stretches of pasture lands devoted to stock raising. Wooded river bottoms such as these are particularly suitable for cattle breeding and dairy farming.

all, how many of the once ridiculed Kansas innovations, like "blue sky" laws and woman suffrage and abolition of disease-spreading common towels and cups, have been adopted on sober second thought by the nation.

The first white man who saw the broad plains of Kansas was Coronado, who with his company of Spanish explorers traversed this region in 1541. All of the present state except a small corner in the southwest came into the possession of the United States in 1803 as part of the Louisiana Purchase (*see* Louisiana Purchase).

KANSAS CITY, KAN. Only an imaginary state line divides the largest city of Kansas from its twin city on the Missouri side. The two cities are one industrially and commercially and are served by the same street-car line, the same telephone system, and, for the most part, by the same union railway terminal. The Kansas metropolis lies on both sides of the Kansas River, to the west of Kansas City, Mo., rising in the west to bluffs and hills upon which much of the residence portion of the city is built. The bottom lands in the river valley are the seat of many great industries and factories, chief of which are the slaughtering and meat-packing establishments. Owing to their position among the corn and beef states of the southwest, the two Kansas Cities rank together as the second live stock market in the United States, after Chicago. They also manufacture soap and candles and various other articles subsidiary to the packing industry.

The advantages of natural gas and oil, combined with excellent railway facilities, have helped greatly in building up the industries of Kansas City, Kan. In addition to its stockyards it has large flour mills and grain elevators, oil refineries, iron and steel works, foundries, and lumber and brick yards. There are many miles of boulevards in the city, and several beautiful parks. In the business district, adjoining Huron Park, the well known Wyandotte Indian cemetery is still preserved. These Indians were the original settlers of the district and Wyandotte was the largest of a number of small towns which combined in 1886 to form Kansas City, taking the name of the Missouri town. In 1909 Kansas City adopted the commission form of government. Population, about 102,000.

KANSAS CITY, MO. Before railroads came to locate cities where they chose on the checkerboard of America's great West, the early settlers and traders selected a favorable place at the head of a valley, on overland trails, or at the junction of rivers. It is the happy fortune of Kansas City to have been founded where the Missouri and Kansas rivers join, and where the old Santa Fe trail to Mexico and the great southwest begins. Today more than 30 railroads gather and distribute wealth from a city so well located originally. This explains why Kansas City has become one of the

WHERE KANSAS EDUCATES ITS YOUNG MEN AND WOMEN



These buildings form part of the University of Kansas at Lawrence. To the left is Fraser Hall, the center shows the large Administration Building, while to the right are the Robinson Gymnasium and Haworth Hall, devoted to mining, engineering, and geology. In addition to its educational work, the university furnishes many advisers on technical subjects to the state government.

important cities of the country, not only in trade and population but in manufacturing also.

Located in the heart of a great agricultural and fruit-raising area it is the largest winter-wheat market in the world, and the third primary market in receipts of general grain in the United States. With its twin city, Kansas City, Kan., it ranks next to Chicago as a live stock market. It stands first as a yellow pine market, first in the distribution of agricultural implements and seeds, first as a hay market, first in reciprocal insurance business, and first in stock feed. It is the third largest flour-milling center in the country, and third in the manufacture of soap. Other leading manufactured products are automobiles, chemicals, iron and steel products, crude and refined oil, and packing-house products. Kansas City stands among the leading half-dozen cities in bank clearings in the country, and it is also the reserve city for Federal Reserve Bank District No. 10, comprising the states of Nebraska, Wyoming, Kansas, Oklahoma, Colorado, the northern section of New Mexico, and the western section of Missouri. The railroads entering the city have as their central point one of the largest union stations in the United States.

Kansas City is picturesquely situated on the bluffs which rise above the Missouri River bottoms in three terraces. The manufacturing and wholesale districts are on the lower elevation and are connected by tunnels and ornamental viaducts with the central business or retail section of the city on the second elevation. On the third and highest elevation is the residence district.

The city has an extensive park system, and the parked boulevards connecting the parks and forming circuits around and through the town are among the most extensive in the country. The high bluffs admit of effective landscape treatment, and the cliff drives running along them are justly famous.

The development of the city has been rapid. Originally a river landing about two miles above Westport, it was laid out and the first lots sold in 1850. The heavy timber which covered the section which is now the busiest part of the retail district was not cleared away until after the Civil War. The town soon became the center of a thriving trade with Old and New Mexico and with the Indian tribes in the territory west and southwest. Kansas City is said to be more American than any other city of its size, 89 per cent of its people being American born. In 1860 the population was less than 4,000; in 1900, it had increased to more than 150,000; in 1910, to nearly 250,000; and in 1920 to 324,410.

KANSAS-NEBRASKA ACT. The Kansas-Nebraska Act, passed by Congress in 1854, has been pronounced the most momentous piece of legislation in the United States before the Civil War, for it set in motion the train of events which led directly to the conflict over slavery. In January 1854, with the support of President Pierce, Senator Stephen A. Douglas of Illinois laid before the Senate a report of the Committee on Territories which provided for the organization of the territories of Kansas and Nebraska, allowing the people of these regions to decide for themselves whether they would allow slavery within their borders. The opponents of the bill said that the principle which it contained was that of "squatter sovereignty." The bill as finally enacted into a law expressly repealed the Missouri Compromise which had prohibited slavery north of latitude 36° 30′—a compact which for a whole generation had been regarded as a binding agreement between the people of the North and the South.

The news that such an act was contemplated fell like a thunderbolt upon the people of the North. Mass-meetings were held to denounce the measure; ministers preached against the "Nebraska iniquity;" and Douglas was accused of weakly yielding to the South in the hope of winning the presidency.

In spite of the anger of the North the bill was passed by Congress on May 22, 1854. The fight over slavery was then transferred to the two territories. Pro-slavery men of the South and anti-slavery men of the North rushed into Kansas, each side determined to win the state. The first elections, in 1855, were carried by the settlers from the South, aided by the "Border Ruffians" of Missouri who had crossed the border the night before election and had taken possession of the polls, illegally casting their votes for a pro-slavery candidate for governor. The settlers from the North refused to abide by the result of this fraudulent election. They held one of their own, at which the pro-slavery men refused to vote. As a result two rival governments were set up in the territory, and a veritable civil war ensued, in which the anti-slavery party under the leadership of John Brown retaliated with violence to the violence of the pro-slavery men. The attention of the whole country was fixed on "Bleeding Kansas." The advantage lay with the settlers from the South, for they had the support of President Pierce, who eventually sent United States troops into the territory to quell the disturbance and to disperse the free-state legislature. A new election was then called, and again the illegal methods of the pro-slavery party won the day. But Congress refused to recognize as legal the constitution adopted by such methods, and Kansas was forced to remain a territory a while longer. As time went on, the free-state settlers became more numerous, and finally the South gave up the attempt to make Kansas a slave state. A new constitution was then drawn up, and on Jan. 29, 1861, on the eve of the Civil War, Kansas was admitted to the Union as a free state.

KATYDID. Throughout the late summer nights the katydid sings unceasingly in the tops of the tallest trees, "*Katy did; Katy didn't; she did; she didn't.*" It is one of the most vigorously musical of all of our long list of insect songsters. It is said by dwellers in the country that from the time the first katydid sings to the first autumn frost will be a period of six weeks, a prediction often fulfilled.

Only the male katydids are the music makers, and the song which they sing is the mating call to the females. The tone is produced by rubbing a scraper at the base of one of the front wings across a file on the base of the other. The sound will often carry a quarter of a mile on a still summer night. Catch a "katy" and put him underneath a tumbler, and when he has got over his fright he will give you a fine concert, and moreover show you just how he plays his curious wing fiddle.

Katydids are of a delicate green hue that almost exactly matches the green of the leaves wherein they hide. The hind legs are the longest and most powerful, which makes the katydid, like its cousin the grasshopper, a very good jumper. The two *antennae* or feelers upon the head are very long and fragile. The body is rather broad, and boatshaped, and the wing covers are delicate and thin —not heavy like those of the grasshopper.

THE GRASS-GREEN SINGER OF THE TREE TOPS



Here is a katydid, munching contentedly upon a leaf. Day and night he sits in the tree-tops, and by rubbing together a scraper and file mounted at the base of his wings, he emits the cheerful note which gives him his name.

Katydids lay eggs in regular rows, early in autumn, which may be found on twigs, branches, leaves, and edges of fence boards, securely gummed in place by a glue which the female secretes. When ready to hatch, in the following spring, each egg splits along the top, and the young "katys" squirm out. At first they are very pale in color, but they soon assume the leaf-green tints of the adult. In the South there are usually two broods a year, due to the length of the summer season. In the North there is but one. There are several species, all peculiar to North America and none especially harmful to vegetation.

The katydid belongs to the great family of the *Orthoptera*, or straight-winged insects, which also includes grasshoppers, crickets, and "walking-sticks." The angular winged katydid of the western and southern states is *Microcentrum retinervis*.

Keats, John (1795–1821). "Here lies one whose name was writ in water." This is the epitaph which the great English poet, John Keats, wrote for himself in the melancholy days when he felt his death approaching, and despaired of winning that fame for which he so ardently longed. Keats lived only a little more than 25 years and his whole poetical career was but seven years long, yet during this brief period he wrote some of the greatest poems in the English language, crowded with lines of exquisite and haunting beauty that will live as long as the language is spoken.

John Keats was the son of a livery-stable keeper. He passed his early years, not close to nature as did most of our poets, but in the city of London, and yet in some marvelous manner there was born in him an intense love of beauty. "A thing of beauty is a joy forever" is the first line of his 'Endymion', and in his 'Ode on a Grecian Urn', in which he seems indeed to have caught much of the ancient Greeks' worship of beauty, he declares:

> Beauty is truth, truth beauty,—that is all
> Ye know on earth, and all ye need to know.

Beauty was all in all to Keats. Unlike his great contemporaries Shelley and Wordsworth, he had no desire to reform the world or to teach a lesson. He was content if by his magic power he could make us see and hear and feel with our own senses those marvelous forms and colors and sounds that his imagination bodies forth. Yes, in what is perhaps the richest of all his poems—'The Eve of St. Agnes' — he even makes us taste the—

> . . jellies soother than the creamy curd,
> And lucent syrops, tinct with cinnamon.

Keats was apprenticed to a surgeon in early youth, and studied surgery faithfully for seven years, but his heart was elsewhere. "I find I cannot exist without Poetry," he said, "—without Eternal Poetry." In 1816 he became acquainted with Leigh Hunt, Benjamin Haydon, the painter and through Hunt with Shelley. In the following year at 22 he gave up his profession and devoted the rest of his short life to poetry.

In 1818 his first long poem, 'Endymion', appeared. It was bitterly and harshly attacked by the reviewers, who overlooked its beauties and failed to see that its faults were due to immaturity. Other troubles crowded upon the young poet. He was in money difficulties, and worst of all he was tormented by a hopeless love affair. His health had begun to fail and he rapidly developed consumption. In the autumn of 1820 he went to Italy and early in the following year he died at Rome.

Keats' chief poems are: 'Endymion'; 'Lines on the Mermaid Tavern'; 'Isabella, or The Pot of Basil'; 'I Stood Tiptoe upon a Little Hill'; 'The Eve of St. Agnes'; 'La Belle Dame Sans Merci'; 'Ode to a Nightingale'; 'Ode to Autumn'; 'Lamia'; 'Hyperion'; and a number of sonnets, among which are 'On First Looking into Chapman's Homer', 'When I Have Fears That I May Cease to Be', and 'Bright Star, Would I Were Steadfast As Thou Art!' All were published between 1817 and 1820.

KEEPING OUR WORD

WE HAVE lived to very little purpose in the world, however few our years may be, unless we have found that we live by faith—faith that causes will have consequences, faith that seed will bear fruit, faith in the conduct of others, faith in the good will of those about us, faith in the wisdom of those above us.

And this faith we must have in one another; we must so live with our neighbors in the world that there is mutual trust between us. We must have faith in those about us; those about us must have faith in us. We must all *keep* faith. We call it "keeping our word."

Life is not worth living if men break their word. If we cannot believe a man we can have no dealings with him, either buying or selling. We buy a thing in a shop believing it to be what it is said to be; we take the shopman's word, and if he speaks the truth we buy from him again. If he sells us brass and tells us it is gold, we buy from him no more, and his trade is ruined. Men cannot prosper on a broken word.

We could have no home to live in if men did not keep their word. We live by the side of hundreds of people who could rob us or poison us, but they live at peace with us instead; they have given their word, and we believe them. We go to bed at night, we leave our homes by day, because we believe that men will keep their word.

We could not travel if men did not keep their word. We go into a strange country and trust our lives and our money to people we have never seen before, perhaps to people whose language we do not understand. But here also runs the honorable understanding of men who keep their word. A strange man takes our bag, another takes our money, another carries an important letter. We go on our way because we trust them all. We take their word.

There is neither work nor wages for us if we break our word. We work for a week or a month on a promise that our wages will be paid. Men give us their labor, and we give them ours, because we pledge our word. We put our money into the bank, we leave our watch at the watchmaker's, we trust a man with an important piece of information, we risk our very lives, on the promise of a word.

Keeping our word means keeping it at no matter what cost. A ship captain takes his mighty craft to sea, filled with a rich cargo, carrying people who trust their lives to his care. They trust him, the owners trust him, because he has given his word to "stand by the ship" to the end. The vessel strikes a rock or an iceberg. The life-boats are put out, the passengers and crew flee to safety. But the captain stands on the bridge and "goes down with the ship." He is keeping his word.

The great Roman Regulus, taken prisoner by the Carthaginians, was sent back to Rome to plead the cause of Carthage. He gave his word that he would either persuade his countrymen to make peace or that he would return. Once in Rome, he urged the Romans to fight on, telling them Carthage was tottering. His friends urged him to break his parole, to remain at home. He scorned the suggestion, and went back to Carthage, where he was put to death with horrible tortures. But he had kept faith with Rome and he had kept his word to Carthage.

Bankers say that the best security for the money they lend is the word of an honorable man—better than land or rich property. For this may fail in value, but the value of an honorable word never fails. Many a good and wise man has been forced into bankruptcy by an ill stroke of fate. The law has told him, then, that his debts are wiped out, that he is no longer "legally" bound to pay them. But this man counts his word higher than the law. He works his fingers to the bone; he pays back every cent. And then the world bows before him; he wins the highest title of honor within the gift of his fellows. He is called a "Man of His Word."

A nation trusts its people, keeping police for those who break their word. And a nation trusts other nations, binding itself to do certain things so that there may be order and good government and understanding in the world. England, France, and Germany gave their word to Belgium, and Belgium trusted them. Germany broke her word, and the World War came. Every nation must protect itself against the broken word that would destroy its homes, its freedom, and the good name that is so dear throughout the world.

KELLER, HELEN (1880–). "Once I knew the depth where no hope was, and darkness lay on the face of all things. My life was without past or future, I fretted and beat myself against the wall that shut me in. But a little word from the fingers of another fell into my hand that clutched at emptiness, and my heart leaped to the rapture of living. Night fled before the day of thought, and love and joy came up in a passion of obedience to knowledge."

In these words Helen Keller describes her emergence from that "darkness and stillness" which closed in upon her when, at the age of 18 months, she was deprived at a single stroke, by a severe illness, of both sight and hearing. And with those senses had gone the power of speech, leaving her blind, deaf, and dumb.

When she was nearly seven years old, her parents, who had read Charles Dickens' account of the wonderful work done with another blind and deaf girl, Laura Bridgman, sent to the Perkins Institute for the Blind, at Boston, for an instructor. Miss Anne M. Sullivan (Mrs. John A. Macy) was sent, and became Helen's constant companion and teacher.

From the first, the child learned with remarkable facility. She learned to read and spell the finger alphabet, to read by the Braille system, and to write with a typewriter. Finally, by placing her sensitive fingers on the lips and throat of her teachers, she learned not only to "hear" them speak, but—marvel of marvels—to speak herself. At 20 she had made such progress that she was able to enter Radcliffe College, getting her B. A. degree in 1904. Her textbooks were printed in Braille, she wrote the examinations on her typewriter, and in place of recitations she had conferences with her teachers. Miss Sullivan attended class with her, and spelled the lectures and discussions into her hand by the finger alphabet.

After graduation Miss Keller served on the Massachusetts Commission for the Blind and on committees of various societies for the blind. She also became widely known as a writer and lecturer. Other persons with handicaps similar to hers have broken their barriers and learned to communicate with their fellows. What distinguishes Helen Keller is the brilliancy of mind and fineness of character revealed behind these barriers, the unrivaled degree to which she has developed her powers and the usefulness of the work she has accomplished. (*See* Blind, Education.)

Miss Keller has told her experiences in several books, including, 'The Story of My Life' (1903); 'Optimism' (1903); 'The World I Live In' (1908); 'The Song of the Stone Wall' (1910); 'Out of the Dark' (1913).



KENTUCKY. To the east and southeast a ridged and furrowed mountainous belt, not high but steep, here bald and frowning, there shaggy with forest growth; westward of that a tumbled plateau region, subsiding step by step into well-wooded rolling or level plains and alluvial river valleys; and beyond that depressed like a saucer in the north central portion of the plateau, the green parklike Bluegrass region molded into long wavelike curves and swells—this, in rough thumbnail sketch, is Kentucky, the Bluegrass State.

Extent.—East to west, about 425 miles; north to south, 40 to 170 miles. Area, 40,598 square miles. Population (1920 census), 2,416,630.

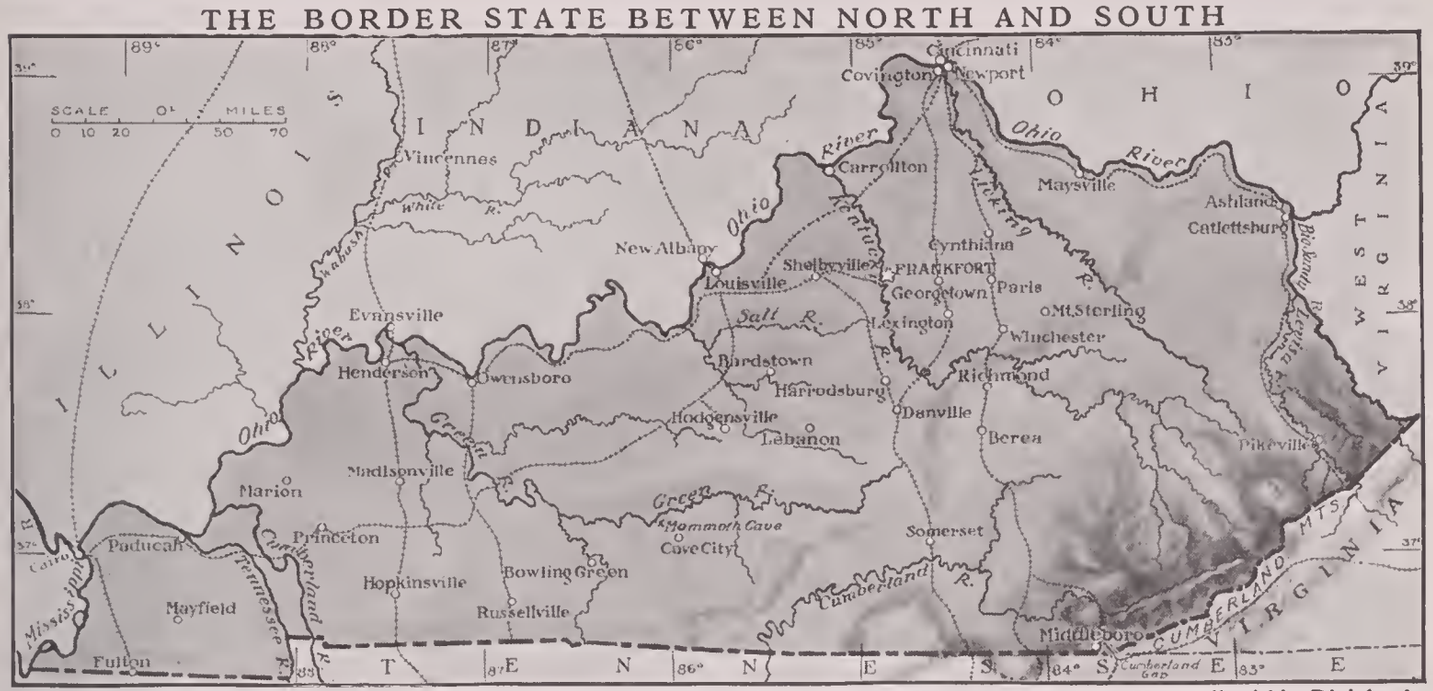
Natural Features.—Cumberland Mountains and Plateau (Big Black Mountain, 4,100 feet) in east; in center, bluegrass plains; in extreme west, fertile river bottoms. Principal rivers: Big Sandy, Licking, Kentucky, Green, Cumberland, and Tennessee, all flowing into Ohio River, which forms northern boundary.

Products.—Tobacco and tobacco products; corn, wheat, hogs, cattle, and horses; coal and petroleum; flour and meat products; hardwood lumber and timber products; iron and steel manufactures.

Chief Cities.—Louisville (about 235,000), Covington (58,000), Lexington (42,000), Newport (30,000), Paducah (25,000), Frankfort (capital, 12,000).

The mountains that form the eastern wall are not so high as some of the more northern Appalachians, but they are steeper. The first settlers, except those that came by way of the Ohio River, crawled through the Cumberland Gap like lines of ants across the nicked rim of a honey jar. The honey lay in the Bluegrass saucer and the river basins—lands made rich by alluvial deposits and the crumbling phosphatic limestone base — land where even today, after nearly a century of cultivation without fer-

THE BORDER STATE BETWEEN NORTH AND SOUTH



With the Ohio River separating it from the busy industrial states of the north, and its southern boundary well within Dixieland, Kentucky shares more than any other state in the characteristics of both regions. On the one hand are manufacturing centers and on the other rich plantation districts, while the eastern third of the state runs into the Appalachian range with its characteristic mountain life.

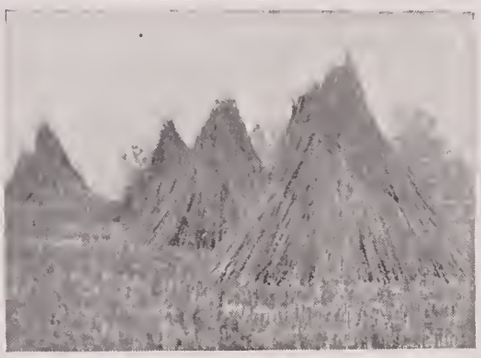
tilizers, a farmer gets two crops from a field in a season, or two cuttings of clover from a meadow, with rich grazing besides.

These exceptionally fertile lands—among the best in the world — comprise about 10,000 square miles, or nearly a quarter of the state's area. About two-thirds of the remainder, or 22,000 square miles, is good agricultural land, but susceptible of exhaustion. There are about 7,000 square miles of inferior lands—only an insignificant fraction is entirely useless so far as agriculture is concerned.

A land of milk and honey indeed! What wonder that it drew the white man over mountain and rough wilderness infested with Indians? The early settlers might have to toil early and late, what time they were not defending themselves against Indian raids; they might have to weave themselves garments out of hemp and nettle fiber and buffalo wool; their bedsteads might be poles laid on pronged sticks thrust in the dirt floors of their log cabins—but the fare served on their puncheon tables was abundant to the point of frontier luxury.

At various times, even while much of the state was still covered with virgin forest, Kentucky has stood first among the states in production of wheat, hemp, Indian corn, wool, and flax. For nearly a generation it has been the leading tobacco-growing state, producing nearly one-third of all the tobacco produced in the United States.

KENTUCKY HEMP



The length of the cut plants in the stacks shows how Kentucky conditions favor hemp—a crop in which the Bluegrass State leads the Union.



While tobacco is the principal sale crop, the most valuable single crop is corn, which, like the other cereals, is used chiefly within the state. Wheat and hay, and, in the Ohio Valley region, vegetables and orchard fruits, are also important crops.

What tobacco was to early Virginia, hemp was to Kentucky. Hemp was sown in the first Kentucky clearings; it furnished fiber for the pioneers' clothing and was the local medium of exchange, being even receivable for taxes. Kentucky early became one of the leading hemp-producing regions of the world, and great fortunes were made in it before the Civil War. Hemp has long ceased to be the money-making crop of the state, yet it is still raised and it retains a sentimental value as a characteristic Kentucky product. Kentucky writers dwell lovingly on the beauty of the plant, with its fernlike foliage and the delicious, pungent, balsamic fragrance of the brilliant green hemp fields (*see* Hemp).

The state's chief pride, however, is the famous Kentucky thoroughbred horse. A mild winter climate, splendid pasturage the year around, and abundant water, particularly in the Bluegrass region, marked the state as naturally adapted to stock-raising. Shorthorn cattle were in the early times raised on the Kentucky plains and driven across the mountains to market in the tidewater country, and cattle

and sheep are still raised to a considerable extent. But Kentuckians were not satisfied with a product in which mere quantity counts most; something akin to an artistic desire for perfection found expression in the development of the finest road horses in the country. One of the few brief acts of the first legislative assembly held west of the Alleghenies had to do with the preservation of the breed of horses. The patient unwearying effort of a long line of intelligent breeders has produced a strain of thoroughbred saddle horses combining speed and endurance to an unusual degree. Three-fourths of the winners on the American turf, it is said, have been Kentucky horses; and the record on the trotting track has been no less notable.

A state which has fine horses must have good roads. Kentuckians delight in long, level, straight roads, macadamized with the underlying native limestone. Few states have a system of highways to compare with the Kentucky turnpikes.

Being blessed with social dispositions, in addition to fine horses and splendid roads, Kentuckians see no reason why country life should be either lonely or monotonous. Unmeasured hospitality on the lordly scale practiced before the Civil War is impossible now; but still Kentuckians at home are open-handed and open-hearted, and away from home to be a Kentuckian is to possess the grip and password that commands instant response from any other member of the fraternity.

Louisville (*see* Louisville) is the chief city and principal manufacturing center. Covington, the second manufacturing city, making tobacco, cotton, iron, and steel products, is the seat of a Catholic bishopric and cathedral. Whereas most of the original settlers of the state came from Virginia, North Carolina, and the back counties of Pennsylvania, an appreciable Catholic element came from Maryland. Frankfort is the capital; in a cemetery near by are buried many noted Kentuckians, among them Daniel Boone (*see* Boone). Lexington, the home of Henry Clay (*see* Clay) and of the "fall trots" is the center of the stock-farming region and a market for tobacco (especially loose leaf), hemp, grain, and live stock. It is also an educational center, for it has the state university, and other educational institutions.

The state's manufactures are of minor importance compared with agriculture and stock-raising. The principal manufactured products are flour and grist, lumber and timber products, the various forms of tobacco, leather and cotton goods, packed meats, cotton-seed oil and cake, iron and steel products. Corn whisky, commonly called "Bourbon" from the county in which distilling was first extensively carried on, was formerly an important product.

What goes before applies chiefly or altogether to central and western Kentucky. The mountain belt in the east is another story, just as it is in most of the Southern states through which the Appalachians run. So long as the transmontane roads from lowland

CURING KENTUCKY TOBACCO



Tobacco growers use different methods for curing the leaves, depending upon the kind of leaf and purpose for which it is to be used. In the method known as the "Kentucky cure," the tobacco is hung in the barn, and a system of iron pipes carries a moderate degree of heat from outside fires for a period of several weeks.

Kentucky to the seaboard were in use, there was some communication between the mountains and the plains; but more and more, from 1830 on, as other routes came into use, the mountaineers were marooned, cut off from advancing civilization, and largely forgotten, except when distasteful reminders of their existence floated down in tales of feuds, moonshining, or lawless resistance to officers of the law in "bloody Breathitt" or some other mountain county. Lacking schools, records, roads, and money, the mountaineers have a high percentage of illiteracy and few links with the past except their names (largely English and Scotch), their speech, in which linger many words obsolete elsewhere since Shakespeare's time, and customs and ballads of equally ancient origin. Trachoma and hookworm have seriously impaired their vitality within the last few generations. Yet, being a hardy and virile stock, they have multiplied rapidly, now forming about 25 per cent of the state's population. The Federal government is now stamping out trachoma and hookworm. Feuds and moonshining are going out of fashion, and education is eagerly welcomed, as Berea College and other educational institutions for mountaineers testify. The "moonlight schools" (schools held on moonlight nights) are sometimes attended by whole families. Abraham Lincoln, it may be noted, was born in Kentucky of mountaineer stock.

WHERE THE RUGGED HILLS YIELD COAL



This mine near Middlesboro, where Kentucky joins both Tennessee and Virginia, is typical of those which supply the state's important coal output. Kentucky possesses two coal fields, the eastern one lying in the Appalachian region and the western field being part of the same formation which underlies Illinois and part of Indiana.

Kentucky is one of the leading coal-producing states. Petroleum and natural gas are also found in many parts of the state and production has recently increased greatly. Iron ore is found in the northeastern part of the state, but is not extensively mined. Limestone underlies the whole state, and much of it is good for building; a good structural sandstone is also found. Clay and cement rock are also abundant. Near Louisville are extensive deposits of asphalt rock. Lead and zinc are also found. About a third of the state is still covered with marketable timber.

Two of the important natural features of the state are the extensive mileage of navigable water afforded by the Ohio and its tributaries and by the Mississippi, and the number of caverns, the largest of which is Mammoth Cave (*see* Cave).

Until 1792, when it was admitted as a separate state, Kentucky was a part of Virginia. Cumberland Gap, the natural gateway from Virginia, was discovered and named in 1750 by Thomas Walker, an explorer for a land company. In the same year, Christopher Gist, employed by another land com-

HOW THE STATE USES ITS RIVERS



Here is a scene reminiscent of older days, when flat-bottomed stern-wheel steamers carried most of Kentucky's commerce. River steamers still handle an important part of the bulky freight.

pany, descended the Ohio River to the falls of the Ohio (Louisville). But the French and Indian War delayed settlement until after 1765. In 1769 a party which included Daniel Boone entered by the Gap, and soon numerous settlers poured in by the route and down the Ohio. A convention called at Boonesborough by Richard Henderson, in 1775, to form a state government came to nothing because of the opposition of Virginia.

During the Revolution Kentucky was harassed by British and Indian attacks as a result of Virginia's neglect, and new efforts, which finally succeeded, were made to form a separate government. The difficulty of getting their produce to markets was another problem of the early settlers. This led in 1825 to the building of the first railway west of the mountains—between Lexington and Frankfort.

Over the great question of slavery and secession the sentiments of the state were divided. In the Civil War it contributed 80,000 troops to the Union cause against 40,000 for the Confederacy. In spite of the Confederate invasion of 1862, a government favorable to the Union was maintained in power. But the emancipation of the slaves without compensation to their owners turned many Union men against the government, so that usually the state since the war has been Democratic.

OLD AND NEW CAPITOLS



The upper view shows the old State House at the head of St. Clair Street in Frankfort. The lower view shows the new capitol, completed in 1907 at a cost of over $2,000,000. It is 400 feet long and the top of its dome is 205 feet above the terrace line. It houses the state library and the library of the Kentucky State Historical Society.

Kepler, Johann (1571–1630). The son of a brawling irresponsible German soldier of fortune, cradled in poverty and neglect, crippled from childhood in the hands so that nice manual dexterity with instruments was impossible to him, too dim-sighted to make keen observations, too delicate of constitution to bear long exposure to night air—surely never was a great astronomer so handicapped by nature and circumstance as Johann Kepler, who nevertheless was one of the greatest. He was educated at the University of Tübingen for the ministry, but with his appointment to the chair of mathematics and astronomy at Gratz (Austria) came the call to his life-work.

The German astronomers of that day were mostly astrologists and fortune-telling charlatans, and Kepler was naturally reluctant to rank himself in such company. So having accepted astronomy as his career, he bent all his energies to extracting from observations of the stars some real knowledge of the universe. All that was yet known of planetary motion was what Copernicus had established—that the planets move, not around the earth, but about the sun (in circles, it was still supposed). Two other great men, the Italian Galileo and Tycho Brahe, a Dane, were seriously studying the heavens at this time. Kepler became acquainted with both of them through correspondence, and in 1600 accepted an invitation to become Tycho Brahe's assistant in his observatory near Prague (Bohemia). Brahe's death the next year opened the way for Kepler's appointment to succeed him as mathematician and astronomer to the Emperor Rudolph II. He now devoted himself even more to discovery. One theory after another was tried and abandoned, until at last, "after incredible labor, through innumerable wrong guesses and after six years of almost incessant calculation," he hailed with wild delight the three laws which brought order out of the chaos of astronomy and prepared the ground for Newton's discovery of the law of gravitation. (*See* Astronomy.)

To the end of his life Kepler was dogged by misfortune—by war, which interrupted his work; by illness, and domestic calamity; by poverty, for his salary was always in arrears—nor was his position improved when, in 1628, he left the emperor's service to enter that of Wallenstein, the great general of the

Thirty Years' War. Yet from the pursuit of truth he won a joy untouched by outward troubles. His wife asked him one night what he had been doing so long on the roof. "I have been thinking," said he, "the thoughts of God."

The laws of planetary motion which are still known as "Kepler's laws" may be stated as follows: (1) The path of every planet in its motion about the sun forms an ellipse, with the sun at one focus. (2) The speed of the planet in its orbit varies so that the line joining the center of the sun with the center of the planet sweeps over equal areas in equal times. (3) The *time* taken by any planet in its revolution about the sun has a definite relation to its *distance* from the sun, the "square" of its time being in exact proportion to the "cube" of its distance. These three laws give us the principle "by which the universe is balanced," and enable astronomers to tell the exact position of any planet at any time, past or present. Kepler arrived at his laws as the result of an enormous number of observations of the planets and endless labor of calculation. He set his laws down as facts of planetary motion without knowing *why* they were so. It remained for Newton, with his discovery of the law of gravitation, to supply the explanation and so complete Kepler's work.

KEY WEST, FLA. From the mainland of Florida to Key West is a strange journey. As you look out of the train window, you feel much as if you were taking an ocean trip, for the railroad leaps from island to island of the Florida Keys which stretch south from the coast of the peninsula to Key West, the outermost island. Occasionally, close by the roadbed, you see a lazy shark glide along through tangles of seaweeds and sponges of grotesque forms, and in deeper waters you may even be startled by a glimpse of a sea-cow.

WHERE RAILROAD TRAINS GO OUT TO SEA



Did you know that you could load a car of freight in Chicago, and have the car unloaded in Cuba? This stretch of concrete archways known as the Long Key viaduct is part of the system that makes this possible. For 130 miles these viaducts jump from island to island to connect the mainland of Florida with Key West, and from there huge car ferries complete the trip.

This journey of 130 miles was made possible by Henry M. Flagler, who promoted this remarkable engineering feat and spent large sums of money in the construction. The 30 islands on the route are connected by long stretches of concrete viaducts and stone embankments built on the ocean bed. Great car ferries run from Key West to Havana, Cuba (about 100 miles), so that freight may travel from New York and Chicago to Cuba in through cars.

Altogether there are about 10,000 of these "keys" (so called from the Spanish word *cayo*, meaning "reef"), most of them of coral formation. The larger islands are covered with tropical vegetation—the jasmine, almond, banana, and coconut palm—but most of them are low reefs submerged at high tide. Frost never reaches them, and the trade winds blow so soothingly that the heat is rarely oppressive. The sun shines 365 days in the year, and is rarely obscured for more than a few hours at a time. This climate, with an average winter temperature of 70 degrees, makes Key West an ideal winter and health resort.

Shipbuilders, spongers, fishermen, cigar-makers, machinists, truck farmers, and fruit growers all find employment in or near Key West. Most important is the cigar industry, which employs about 6,000 people and represents nearly one-third of the total factory product of the entire state of Florida. Most of the tobacco is imported in the leaf from Cuba, the tariff on leaf tobacco being less than on manufactured.

Key West is also an important naval station, with an excellent harbor in which the largest ships can float. Navigation is dangerous, however, because of the reefs. The United States government has erected two lighthouses in the harbor and disasters once so frequent that "wreckers" did a profitable business are now less frequent. Population of Key West, about 20,000. (*See* map of Florida.)

KIDD, CAPTAIN WILLIAM (1650?–1701). Of all the reckless sea-rovers who flew the "Jolly Roger" at the mastheads of their pirate ships, made their poor victims "walk the plank," and buried their ill-gotten treasures on lonely isles, Captain Kidd is the most famous—though one of the least typical, despite the many legends that have grown up about his name.

William Kidd was a Scottish minister's son, and followed the sea from his youth. In King William's War between the English and the French, he became known as the bold captain of a privateer in the West Indies. By the end of the 17th century he had become a successful shipmaster sailing from New

York. British commerce then suffered greatly from marauding pirates, so, at the request of the governor of New York, Kidd received two commissions from the king addressed to "our trusty and well-beloved Captain Kidd,"—one for suppressing piracy and the other as a privateer against the French. With his 30 guns and his crew of 155 men, the captain jauntily set sail in his ship *Adventure* for Madagascar, Malabar, and the Red Sea region, the chief haunts of the pirates.

Then his troubles began. No pirates were found, a cholera plague destroyed some of the crew, the ship grew leaky, and supplies began to give out. Then, apparently, Captain Kidd followed the advice of his discontented crew and himself turned pirate. He took several small Moorish vessels, was defeated by a Portuguese man-of-war, and captured a Portuguese and an Armenian vessel.

At Last the Day of Reckoning!

But at last the day of reckoning came. In 1699 he deserted his leaky old *Adventure*, boarded one of his prizes, and headed for America. Learning that he had been proclaimed as a pirate, he sent to the governor a part of his booty. He was arrested in Boston, where he landed, and sent to London for trial. There he was convicted of murder for killing a mutinous sailor. After a trial in which the evidence was inconclusive and he kept protesting that he was "the most innocent person of them all," he was pronounced guilty also of piracy. He was hanged at Execution Dock with several of his companions, and his body long hung in chains, a warning to all would-be robbers of the sea.

His fame was spread abroad by the popular ballad "My name is Captain Kidd, as I sailed, as I sailed," and many a romance, such as Stevenson's 'Treasure Island' has been inspired by stories of his adventures. From time to time people still search fruitlessly under the banks of the Hudson or on the shores of Long Island Sound for the hoard of gold and silver and precious stones said to have been buried by him.

KIDNEYS. Did you ever go through the filtration plant of a large city water-works, where the supply comes from an impure source such as a river? There you will see great streams of crude dirty water pumped in, mixed with cleansing chemicals, and finally passed through great beds of sand that stop the impurities, but let the good clear water pass through to the pipes of the city. The kidneys of the human body are the purifying and filtering plant for the blood. The great difference is that the pure blood stays in the body, and it is the poisonous waste that filters off and is eliminated from the body.

The two kidneys are bean-shaped, about 4½ inches long, 2½ inches wide, and 1½ inches thick. One is situated on each side of the spinal column, directly under what is called the "small of the back." The right one is placed slightly lower than the left, to make room for the liver. Their function is to gather up the wastes from the blood and throw them off through the bladder in the form of urine.

The kidneys, which are protected by a mass of fat, are hollow, and on the inside are numerous minute tubes gathered into pyramids. The cells which line these tubes do the work of collecting waste from the blood as it passes over them. Ordinarily the kidneys throw off three to four pints of urine every day. Anything which interferes with the activity of these organs means the accumulation of poisonous waste matter in the body and immediately brings on serious sickness or even rapid death.

It is this fact which makes diseases of the kidneys so serious. "Bright's disease," for instance, is an inflammation of the kidneys which interferes with their normal activity and causes them to throw off albumin. Unless this condition is cured, the waste poison called *urea* accumulates in the blood with fatal results. Sometimes chalklike stones are formed in the kidneys and stop up the waste pipes.

Almost all diseases have some effect on the kidneys, and one of the methods most relied upon by the modern physician in determining the general health of a patient and detecting unsuspected trouble is to subject the urine to chemical analysis.

KIEF (*kē'yĕf*). Flat boats towering with sacks of sugar bound down the Dnieper River to the Black Sea usually cluster about the wharves of Kief, capital of the Ukraine in southern Russia. Its busy marketplace, hugging the river bank, is a blaze of color. Peasants in red-trimmed costumes and tall plaited leather boots or barefooted hurry from stall to stall, elbowing a path among the crowd.

Here and there are dusty long-coated pilgrims, who have trudged weary miles on foot and have perhaps spent their last kopek to come to Kief, the Jerusalem of the Little Russians, where Russian Christianity took its rise. All day long in normal times, they may be seen, staff in hand and bundle on back, clambering up the hills, resting beneath the friendly shade of a tree, or reverently bowing the head at the sound of a bell ringing out from the stone walls of the great Monastery of the Caves, which is the goal of their pilgrimage.

Above the closely built old quarter, which crowns the highest of Kief's many hills, a lovely pale green and white cathedral rises, the golden cupola of whose bell tower is visible for many miles across the steppes. The university near by rivals in importance those of Moscow and Petrograd.

Kief has been called "the mother city of Russia," for it is one of the oldest of the cities of that great land. It was founded before the 5th century, and in the Middle Ages was rich and famous. In the closing years of the 10th century it was the capital of Grand Duke Vladimir, from which he civilized and Christianized ancient Russia. Before the Soviet rule over Russia, Kief was a center of the sugar-beet industry, and carried on a lively trade in grain, live stock, timber, fruits, chemicals, machinery, etc. The city figured in many of the uprisings against the Soviet government. Population, about 600,000.

FROEBEL'S SYSTEM *of* CHILD EDUCATION

Teaching Young Children through Play—The Story of the Epoch-making "Garden" in Blankenburg—Its World-wide Adoption, and Its Modern Developments

KINDERGARTEN. Does it make any great difference what a child does or learns before he is six years old? Friedrich Wilhelm August Froebel (1782–1852) believed that it did, and in order to work out his ideas regarding infant education, he opened a school in the little village of Blankenburg, Germany, in 1837. Two years later he named this institution *Kindergarten* (garden for children) in order to distinguish it sharply from all ordinary types of schools and to suggest the idea of education as a natural growth upon which it was based.

Froebel's school and educational theory proved to be epoch-making. Within a few years both were known in England, France, and the United States. At the present time there is no corner of the civilized world where kindergartens have not been planted.

Scientifically trained educators, while not hesitating to point out its defects, are practically unanimous in asserting that no other educational institution of today embodies so true a conception of the child's nature and provides for it so satisfactorily.

The kindergarten is not a *play* school. That is, it is not simply a school in the ordinary sense, which uses games and play as a means of teaching. The kindergarten gives a large place to play because play normally occupies a large place in infancy and childhood, and because play is nature's own and most important method by which children learn and develop physically, socially, morally, and intellectually. It was because the aims and the purposes of the kindergarten are so different from those of the ordinary school that its creator was unwilling to have the word "school" connected with it, and was not content until he had invented the name "kindergarten."

Again, the kindergarten is not a *busy-work* school. Many people think of the kindergarten as a place where children may be kept out of harm's way until they are old enough to enter the grades and learn something really worth while. This conception is an incorrect one, and as unfair as the former.

Laying a Fine Foundation

The kindergarten is based upon the belief that life is a process of continuous growth, that every period in this process is important, and that just so far as one period is matured and completely lived, just so far will the next period rest on a solid foundation.

Another belief which Froebel stamped on the kindergarten is that the life of the universe is an expression of God. This fact gives the universe unity. Within every undeveloped growing thing, yes, even within the seed or original cell, lies unawakened or incompletely expressed a divine ideal toward which all the elements of its being struggle. The satisfactoriness of the life of any living thing, be it plant, tree, animal, man, or child, can be measured by the extent to which it realizes this inherent ideal.

The purpose of education is to aid the child's nature in its efforts to realize this ideal, by seeing to it that every element of the child's nature is given an opportunity for wholesome self-expression. The child's early yearnings for self-expression are vague, undirected, and unintelligent. He knows neither his capacities, his needs, nor his interests. It is the task of the school and the teacher to aid him here. This the kindergarten seeks to do. How? By providing an environment which will make him conscious of his present needs, interests, and capacities, and which will provide him with the materials and opportunities necessary for expressing and satisfying the same. The materials and activities which the kindergarten uses are generally grouped as follows: (1) gifts; (2) occupations; (3) games; (4) songs; (5) stories.

Learning to Observe Intelligently

The gifts are groups or sets of playthings, ten in number and geometrical in form. They include, first, a box containing six woolen balls—blue, red, violet, orange, green, and yellow; second, a box containing three objects all of hardwood—a ball, a cube, and a cylinder. The third, fourth, fifth, and sixth gifts consist each of a cube subdivided into small geometrical solids, cubical and bricklike blocks. The seventh gift is a set of thin wooden or cardboard tablets, triangular and quadrangular in shape; the eighth, a box of small straight colored sticks; the ninth, circular and semicircular rings; the tenth, a box of seeds, shells, or fine pebbles, representing points.

By using the gifts as playthings the child learns to distinguish colors, forms, numbers, lines, and textures. They are designed to furnish him with an alphabet of sensation, by which he may spell out things and his own experiences in the world of sense impressions into which he is born, but which at first is to him an undecipherable book. They also serve as materials through which the child expresses the ideas and feelings aroused by contact with this world; for example, he uses his little blocks to build a house, thus expressing an idea, or with the sticks of the eighth gift he outlines a pattern or picture on his little table.

A wonderful and almost immeasurable wealth of music, songs, games, and literature has grown up around the kindergarten. Before the time of Froebel the child's intellectual world was barren, containing little besides slightly diluted or made-over materials taken from the literature and music of adults. The kindergarten has created a new world and a new spiritual heritage for infancy.

The extreme devotion of followers of Froebel to their leader produced a slavish devotion to his word

TRAINING FOR THE HARDER WORK TO COME

LESSONS FOR THE EYES



These children are learning how to use their eyes and hands, and are developing their powers of observation, imagination, and inventiveness. Above, at the left, they are stringing beads of different shapes; at the right, they are sorting colored pegs; in the middle, learning to draw; and at the bottom, learning to model in clay.

which checked all efforts to criticize the manner in which he had applied his own principles. More recently there has developed in the United States two groups of kindergartners. The one stands for the traditional program. The other group, the progressives, influenced by recent studies in child psychology, have insisted upon a number of important reforms. The progressives lay little emphasis upon the symbolism and mysticism emphasized by Froebel and by the conservatives. Furthermore, they substitute for the small traditional gifts sets of large blocks and objects representing things of interest in the child's ordinary life. Likewise, they exclude many of the songs and much of the literature to which the conservatives, under the influence of tradition, still cling.

In no other country has the kindergarten had as free an opportunity to develop as in the United States, where it was

brought between 1850 and 1860 by highly educated German immigrants. The first distinctly American kindergarten was opened in Boston in 1860 by Miss Elizabeth Peabody. In 1913 an epoch-making law was enacted by California, later copied by other states, which provides that boards of education of every city, town, county, or district, upon the petition of the parents or guardians of 25 or more children of kindergarten age, *must* provide a kindergarten, and that a tax for its support shall be levied. (*See also* Education; Froebel, Friedrich Wilhelm; Montessori Method.)

KINGBIRD. One of the most familiar American representatives of the tyrant flycatchers (*Tyrannus tyrannus*). It is about eight inches long, nearly black above and white underneath. The head is quite black, with a flame-colored crest surrounded by white and orange which can be erected at will. The kingbird catches insects on the wing, and is often called the bee-martin from the number of honeybees it eats. It is found throughout North America in the summer, but is rare west of the Rocky Mountains. Several related species in the western part of the United States are often called kingbirds. (*See* Flycatchers.)

KINGFISHER. The kingfisher is a trick performer, and by his tricks he gets his living. From a perch sometimes as high as 50 feet above the water he does a sudden dive, seizes some luckless little fish in his long beak, flies back to his perch, tosses the fish into the air, and swallows it head first! At times he beats the fish against the perch before swallowing it, or he may carry the fish away to his young family; but one part of the performance is always the same—the meteor-like swiftness of the bird's plunge.

The kingfishers constitute a large family of about 200 species, distributed over the greater part of the globe, with about 11 species in America. All are remarkable for the beauty of their plumage and their interesting habits (for illustration in colors *see* Birds). They are unsociable birds, and when a pair has taken out "fishing rights" for a particular neighborhood, it allows no trespassing there by others.



Mrs. Kingfisher has just arrived with a dainty fish for dinner. Apparently the youngster below doesn't know yet that refreshments have arrived, for he doesn't seem a bit interested.

The true kingfishers nest in holes which they dig in banks, from 4 to 15 feet deep. The five to eight eggs are laid on a heap of fish bones, and the young grow up in quite a fishy atmosphere.

The belted kingfisher is the commonest American species. It is about 12 inches long, with a bristling black crest which gives it a savage look; its upper feathers and belt are bluish gray, and under parts white. The females have a reddish band across the abdomen. The large bill is a powerful sharp-edged implement that is capable of catching an insect on land, or a slippery fish under water. The call is a loud rattling cry unlike the call of any other bird. This species winters in most of the central and southern parts of the United States. The Texas kingfisher is a smaller bird, green above and white below. He resembles the belted kingfisher in habits.

HOME FROM HER FISHING



The kingfisher family is most numerous in the Malay Archipelago and New Guinea, where there are many beautifully colored species. The common kingfisher of Europe, with its blue-green upper parts and rich chestnut breast, is an example of the striking plumage some members of this family wear.

Many beautiful legends are connected with the European kingfisher, or *halcyon*, as it was anciently called. An old belief was that the seven days preceding the shortest day of the year were used by these birds to build their nests, which, it was thought, floated on the water, and the seven days following were devoted to hatching the eggs. During this period, "the halcyon days," the ancients believed, the sea was always calm. That is why we use the word "halcyon" to describe calm peaceful days. The power of quelling storms was believed to have been conferred upon the kingfisher by Aeolus, the wind-god, who made this dispensation when his daughter, Alcyone, and her husband, Ceyx, were changed into kingfishers. This myth accounts for the ancient and poetical name of *halcyon*.

The scientific name of the kingfisher family is *Alcedinidae* and they belong to the order *Cocyges*, which includes the cuckoos; scientific name of belted kingfisher, *Ceryle alcyon*.

'KING LEAR'. By many judges this master tragedy of Shakespeare is ranked as the finest piece of dramatic literature in the world. Lear, a headstrong old sovereign of ancient Britain, divides his realm into three parts, and then calls on his three daughters to receive each her share according to the love she professes for him. Goneril and Regan, ill-reared and deceitful women that they are, so insult reason with their extravagant avowals that the youngest daughter, simple honest Cordelia, quite disgusted with them, states her own dutiful love too modestly to please the proud old king. He casts her off penniless, so that she would have been poor indeed had not the pitying King of France straightway claimed her as his bride and queen. Having thus foolishly bestowed his kingdom, Lear learns—

> How sharper than a serpent's tooth it is
> To have a thankless child.

Shorn of every kingly dignity, denied by the elder daughters even the respect due to a father, the old man rushes out into the tempestuous night, lest his brain burst with its insupportable storm of rage and grief. In the pauses of the tempest, we hear his terrible curses, his piteous prayers, his mad mutterings, and the bitter pointed chatter of his faithful fool.

One gleam of peace breaks upon his sin and suffering. This is when Cordelia and poor sick Lear are reunited, with the avenging armies of France about them. But their armies are defeated and Lear is next seen bearing the dead body of Cordelia from prison, where her cruel sister has caused her to be hanged. The guilty daughters perish and their party is overthrown, but Lear dies of a broken heart. Describing Cordelia, Lear says:

> Her voice was ever soft
> Gentle and low, an excellent thing in woman.

And it is Lear again, weighing his deserts in the storm, who says:

> I am a man
> More sinned against than sinning.

Gone quite insane with suffering, he replies to the question "Is it not the King?" with the proud remark:

> Ay, every inch a King!

KINGLETS. Except for the humming-birds, kinglets are the Tom Thumbs of the bird world. Though they are not shy, it is difficult to observe these tiny birds for they are always on the move, and the plumage—olive-green above and yellowish-gray beneath—makes them inconspicuous among the leaves of the trees. The male birds have a distinguishing bright spot of orange or vermilion on the top of the head. In the ruby-crowned kinglet this spot is concealed or displayed at will (for illustration in colors *see* Birds). In the golden-crowned it is always visible.



The Ruby-crowned Kinglet is one of the tiniest of birds.

The lovely song of a kinglet is all out of proportion to the size of the bird, but its call-note is thin. Kinglets nest in evergreen forests of the far north and are seen throughout the United States in the fall, winter, and early spring. Their appetite for insects makes them of great value to the farmer.

With the equally tiny blue-gray gnateatcher of the eastern and southern United States, kinglets form the family *Sylviidae*, which is related to the thrushes. The golden-crested kinglet of Europe is a smaller bird, measuring but 3½ inches in length. Scientific name of golden-crowned kinglet, *Regulus satrapa;* ruby-crowned, *Regulus calendula.*

KINGSTON, ONTARIO. The spot where Kingston stands, at the northeastern end of Lake Ontario, from which issues the St. Lawrence River, has played an important part in Canadian history. There in 1673 Frontenac, the French governor of Canada, erected a fort which was known by the name (Fort Frontenac) for more than a hundred years, and remained one of the chief French centers of trade and government until it fell into the hands of the British in 1758. During the Revolutionary War a large body of United Empire Loyalists from the American colonies settled at this point, and changed the name to Kingston in honor of King George III. For many years Kingston remained the most important commercial and shipping city of Upper Canada (Ontario), and for four years (1841-45) it was the Canadian capital.

Kingston today is known principally as an educational and residential city, although its commanding position at the entrance to the St. Lawrence and as the terminus of the Rideau Canal brings it a considerable trade, chiefly in the transshipping of grain. It is the seat of Queen's University, one of Canada's foremost educational centers, and of the Royal Military College. It also has important locomotive and shipbuilding works, as well as a number of factories. Many tourists visit the city every summer, since it lies near the beautiful Thousand Island district of the St. Lawrence. The harbor is one of the best on Lake Ontario, being sheltered by three islands. During the first half of the 19th century it was heavily fortified, but the works are now out of date. Population, about 24,000.

KIPLING, RUDYARD (1865–). An English boy of literary gifts could ask no better fortune than Kipling's—to be born in Bombay, the son of a learned artist, John Lockwood Kipling, curator of the British-East Indian Museum at Lahore, and head of the School of Industrial Arts. Rudyard Kipling grew up in the social atmosphere of the British civil and military service in India; and his imagination was fired by the strange teeming life of the Far East, with its mystery, splendor, and squalor. His education at a typical boys' school, in England, of which he gives a lively account in 'Stalky and Co.', was but an interlude, for at 17 he returned to India, from which he drew his finest inspiration. Some of his best stories were dashed off in the routine of his early newspaper work.

Kipling had written a promising book of verse by the time he was 21; but it was by strikingly original and vigorous sketches of native life, done in the regular course of newspaper work in Lahore and Allahabad, that he attracted serious attention. Some of the stories he had got from his father, but most of them were the rich harvest of his own keen observation and sympathetic insight. Published in book form, these had an instant success in London. A half-dozen other collections of short stories and racy, vernacular verse of army life in India revealed him to a host of delighted readers in Europe and America, as a new and virile writer of fiction and poetry.



RUDYARD KIPLING
A Genius at Telling Stories

At 24, when he returned to England, he had won a conspicuous place among the creative artists of the day. He had the story-teller's supreme gift of brisk narrative, invention, the creation of original characters, dramatic dialogue and atmosphere, that made his best work comparable to that of Poe, Maupassant, Bret Harte, and Stevenson. But his method and his materials were new, and he invested India again with the mystery and romance of the 'Arabian Nights'. In his verse he was unconventional, imaginative, and often inspired. In lively ballads he gave us the image of the British-Indian soldier and made him as "Tommy Atkins" a literary character; celebrated the English sailor, on deck and in engine room; and sang the praises of an English world empire. Not content with fame in two fields, Kipling won a new and perennial audience of little folk with stories of children and inspired tales of jungle beasts and other talking animals. During his few years residence in Brattleboro, Vt., he wrote the novel 'The Naulahka' in collaboration with his American brother-in-law, Wolcott Balestier. 'Kim' is the most notable of his long stories; and 'Captains Courageous', a tale of deep-sea fisheries, is one of the best of adventure stories for boys.

A pioneer in theme and method, his style was highly individual. He has numerous imitators, and a marked influence on other writers of fiction and verse. A few of his short stories and his poems, notably 'The Recessional' and 'McAndrew's Hymn', are already numbered among the classics of English literature. He lives at Bateman's Burwash, Sussex, England.

Kipling's best short stories are to be found in 'Plain Tales from the Hills' (1887); 'Soldiers Three', 'Under the Deodars', 'The Phantom Riekshaw' (1888–89); 'The Day's Work' (1898). His eolleeted poems are: 'Departmental Ditties' (1886); 'Barraek Room Ballads' (1892); 'The Seven Seas' (1896); 'Five Nations' (1903). Novels and long stories: 'The Light that Failed' (1891); 'The Naulahka (with Balestier), 1891; 'Captains Courageous' (1897); 'Stalky and Co.' (1899); 'Kim' (1901). For ehildren: 'The Jungle Books' (2), 1894–95; 'Just So Stories' (1902).

The Story of Mowgli

SUPPOSE that you were a tiny little East Indian boy whose home was on the edge of a great jungle. Suppose that you were sitting one night before a camp-fire with your mother and father and that suddenly, out of the dark, came a tiger, black and tawny and very fierce. Would you have been frightened? Mowgli wasn't.

Shere Khan, the Tiger, was hungry, and when he saw man-flesh he jumped, forgetting the fire. That is how he burned his toes. And because he burned his toes, and had to stop to lick them, the baby's mother and father had time to run. Left to himself, and just old enough to walk, Mowgli crawled away through the long grass.

Father Wolf was stretching himself after a nap when he heard a rustling in the grass outside his cave.

"Look!" he called to Mother Wolf, "a man's cub." Then with careful teeth that did not even scratch the soft skin, he picked it up and carried it into the cave.

"A man's cub went this way," roared Shere Khan, his massive head and shoulders blocking the entrance to Father Wolf's cave. "Give it to me."

Mother Wolf sprang forward, her eyes blazing in the darkness like two green moons.

"The man's cub is mine. He shall live to run with the wolf pack and to hunt with us; in the end he shall hunt *thee!* Go!"

Mother Wolf was very fierce when she was angry, and Shere Khan skulked away, but in his heart was hatred.

"The man's cub must be shown to the Pack," said Father Wolf, when the brown baby had settled down to a rough and tumble play with the wolf cubs. "Wilt thou still keep him, mother?"

Mowgli Adopted by the Mother Wolf

"Keep him!" she gasped. "He came naked, by night, alone and very hungry; yet he was not afraid! Certainly I will keep him. Lie still, little frog. O thou Mowgli,—for Mowgli, the Frog, I will call thee. The time will come when thou wilt hunt Shere Khan as he has hunted thee!"

On the night of the Pack meeting, when the three young wolf-cubs were old enough to run about a little, Father and Mother Wolf took them to the Council Rock. And, rather frightened, they took Mowgli, too. The Council Rock was a bare hill-top where the wolves met, and where the cubs must be shown to the Pack before they could be accepted by



"Listen, you wolves! I, the Man, have here a little of the Red Flower which ye, dogs, fear."

the Free People. Into the center of the circle which they formed Mowgli was thrust forth where the moon made silver daylight of the night.

"Ye know the Law! Look well, O wolves!" Akela, the Lone Wolf, who was their leader, cried in recognition of the new cub.

A roar came from behind the rocks. It was the voice of Shere Khan, demanding his prey. Fearful of the great tiger, one of the young wolves spoke up, asking why this man-cub was taken into the tribe.

Now there is a Law of the Jungle that says, when there is a dispute concerning the acceptance of a cub, two members of the jungle who are not its mother or father must speak for it.

Up rose Baloo, the Brown Bear, teacher of the wolf cubs, and he spoke for Mowgli. Then came Bagheera, the Black Panther. He cited the Law that allows a price to be paid for any cub that is objected to by the Pack. In payment for the man-cub Bagheera gave a bull, newly killed. This was good meat for the young wolves. So Mowgli was taken into the Pack. Mother Wolf had nursed him with her own babies; Baloo, the sleepy Brown Bear, taught him the Law of the Jungle; and Bagheera, the Panther, was his friend.

Mowgli in the School of the Jungle

As he grew up Mowgli learned to hunt and to protect himself, and to climb trees like a monkey for nuts and fruit and honey. Baloo taught him the Stranger's Hunting Call that he must use when he sought food outside his own grounds; the Master Words of the Jungle, that he might claim protection with the Birds and Snake People and all four-footed beasts. He could swim as well as he could run and he could climb as well as he could swim. So he grew strong and brown and wise.

"Little Brother," said Bagheera the Panther one day in Mowgli's twelfth year, "how often must I tell thee that Shere Khan the Tiger is thine enemy?" But Mowgli only laughed, fearing nothing.

"The young wolves are following Shere Khan, who gives scraps from his kill," Bagheera continued. "Akela the Lone Wolf is growing old, when he misses his kill—and the time is very near—he will no longer rule the Pack. The others will kill him, for that is the Law. Then will they turn on thee, Little Brother. Shere Khan is urging them."

At this Mowgli's black brows came very close together, because he knew that Bagheera was speaking truth.

"I have it," said Bagheera, "go thou down to the man's huts in the village and get some of the Red Flower. Thus wilt thou be master."

Mowgli, Master of the Fire

Now the Red Flower is Fire, of which all animals live in deadly fear, and which only man can tame. That same night Mowgli went down into the village. Pressing his face close against a window, he watched the boy who lived there put some of the glowing coals from the hearth into a basket lined with clay. Mowgli walked in, took the basket from him, and disappeared into the dark.

When the Pack met at the Council Rock, Akela, for twelve years leader of the Free People, lay still, for he had missed his kill, and the Law said that he must die. Mowgli sat up very straight, the pot that held the Red Flower clasped between his knees, Bagheera the Panther at his side.

For any subject not found in its alphabetical place see information

"He is my prey," snarled Shere Khan. "Give him to me!"

"Yes, give the man-cub to Shere Khan," returned the young wolves, for they hated Mowgli. Restlessly they circled him, Shere Khan roared hungrily.

"Now is the time," whispered Bagheera, the Panther, and Mowgli rose, holding the fire-pot in his hands.

"Listen, you wolves. Ye have said often that I was a man. I thought myself your brother, and would have stayed with ye always. But now that ye have turned against me, it is not yours to say what shall be done. I, the Man, have here a little of the Red Flower, which ye, dogs, fear."

"Listen," he called, staying his hand, "Akela goes free, to live as he pleases. Ye shall not kill him because that is not my will. I go to the village to my own people. When next I come to the Council Rock, I will come with Shere Khan's hide on my head." He strode off to say good-bye to Mother Wolf and his foster brothers. As he walked he wept, and because he wept he thought he must be dying for he had never wept before.

The dawn was breaking when Mowgli went down the hillside, alone, to meet those things that are called men. In the village he made signs to show that he was hungry. The priest was called and a great crowd gathered. He was taken home by a kindly woman, who fed and clothed him and made him sleep in a house. But the house frightened and angered him, for it seemed like a trap. He was sent out to herd buffalo with the other village children. But it was tiresome business, and he longed to go back to the jungle.

As he sat wearily making grasshopper houses and watching the wallowing cattle, Gray Brother, one of Mother Wolf's cubs, came to him.

"Shere Khan waits for thee by the village gate this evening. But he has eaten and is slow and drowsy from too much food."

"Then we shall catch him," said Mowgli. "To-night I shall have the skin of Shere Khan."

With the help of Gray Brother and Akela, Mowgli divided the buffalo into two herds. One herd was driven to the foot of the ravine where Shere Khan lay sleeping. The other went to the head of the ravine. The two herds formed a rough circle, with Shere Khan in its center. Down they dashed from either end, tumbling, sliding, bellowing. When Akela and Gray Brother separated them again, Shere Khan lay dead.

After Mowgli had stripped the tiger's body of its skin, he and the wolves herded the buffalo and drove them back to the village.

"Sorcerer, wizard, enchanter! Get thee hence!" cried the townspeople as Mowgli neared the gates. The children who herded with him had told the village folk how the wolf-boy had killed the terrible tiger, and how the wolves obeyed him. So with twigs and stones and vile words the village people drove Mowgli back to the jungle.

On the great gay skin of Shere Khan which lay spread on the Council Rock, Mowgli stood in the light of the full moon. Around him the wolves circled begging him to be their leader.

"No," said Mowgli, for he was of man's blood and wise; "I will not lead ye, now that ye are hungry and sore, for when ye are full-fed once more ye will turn on me. I will stay in the Jungle, but I will hunt alone, and be free of any tribe."

So Mowgli hunted only with the four wolves, his foster brothers, and lived a long life in the Jungle.

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KITCHENER OF KHARTUM, EARL (1850-1916). It was a blazing merciless day on the edge of the Egyptian desert. A detachment of the British army, which was vainly trying to rescue Gen. "Chinese" Gordon, besieged at Khartum, had captured two Arabs and hoped to get from them some much needed information. But the men pretended to be deaf, and Major Horatio Herbert Kitchener, who questioned them, could get nothing from them. An hour later a third Arab was thrust into the tent with the others. Presently the three were exchanging confidences in voluble Arabic. After a time the third Arab called the guard and demanded to be taken to headquarters. It was Kitchener himself, in disguise, who had used his expert knowledge of Arabic to learn from the obstinate natives all that he wished to know.

This incident shows clearly both the thoroughness and the resourcefulness of this British officer. Whatever could possibly be of service to him he knew, and he left no stone unturned to accomplish his end. The attempted rescue of General Gordon failed, Khartum fell, and Gordon's head was set in the fork of a tree by the Mohammedan prophet, the Mahdi. Fourteen years later Kitchener, then Sirdar, that is, commander, of the Anglo-Egyptian army, defeated the Mahdi's successor at the battle of Omdurman, on Sept. 2, 1898, and a few days later he marched into Khartum and held a memorial service for Gordon.

This feat, which earned him a place in the English peerage with the title Baron Kitchener of Khartum—or "K of K," as he was popularly called—was no sudden spurt, but was the crowning of many years of unceasing effort in organization and railroad building. He saw war as a great profession where the better organized and equipped forces won and he succeeded because of his attention to these elements.

Kitchener came of a military family and was educated at the Royal Military Academy at Woolwich. In 1871 he fought as a private for France against Germany—anticipating the time, 43 years later, when

he was to aid France against the same enemy as British Secretary for War. As a subaltern in the British army he made the survey map of Galilee in Palestine, and served in Cyprus and Egypt.

When the Boer War broke out, in 1899, Kitchener was sent to South Africa, first as lieutenant-general and chief-of-staff to Lord Roberts, and afterwards as commander-in-chief of the British forces. It was largely owing to his system of transportation, wire barricades, and blockhouses that the guerrilla warfare was finally ended. After the Boer War, "K of K" served for seven years as commander-in-chief in India, made a tour of inspection of the forces of the empire, and was for three years British Resident (chief political agent) in Egypt.

The outbreak of the World War found him in England in consultation with the War Office. He was created an earl and made Secretary of State for War. In this capacity he had charge of the transformation of the British expeditionary force of 160,000 men into an army of 5,000,000. He did more than any other man in England could have done to make the green recruits into a powerful fighting force. "Kitchener's Mob" proved themselves no mob but an inspired army at the test.

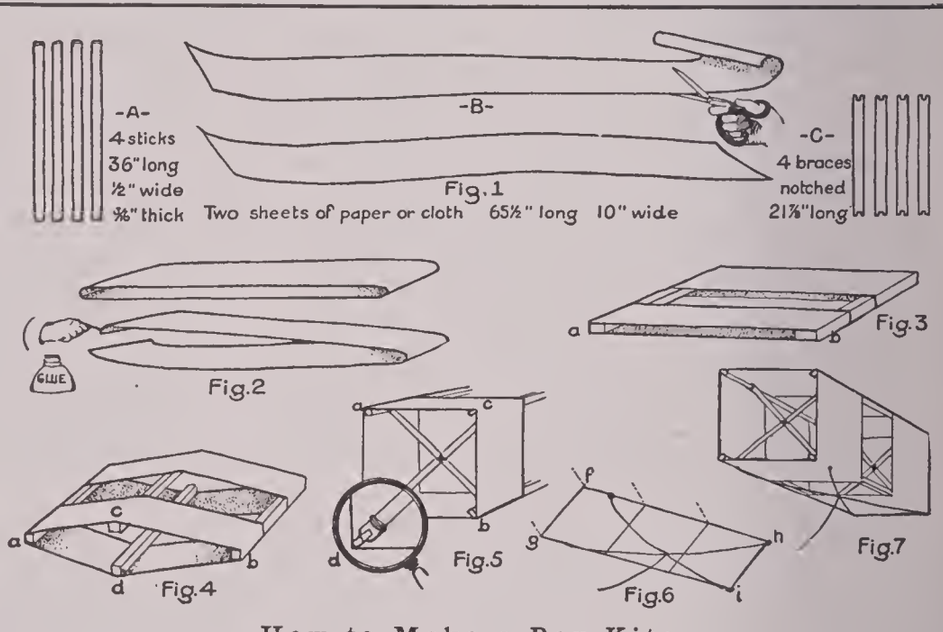
In June 1916, the cruiser *Hampshire* on which he had sailed for Russia was submarined or struck a mine north of Scotland and General Kitchener, with nearly all on board, was drowned. He was honored by his country as few men have been honored, and his fame is secure as a great military organizer.

KITE. A bird of prey belonging to the same family (*Buteonidae*) as the eagles and the hawks. There are four species of kites in the United States, varying in length from 14 to 24 inches. The swallow-tailed kite, the largest of the group, has a white head and underparts, and black upper parts. The white-tailed kite, 17 inches in length, has light bluish-ash upperparts and white underparts and tail. The Everglade kite, which measures 18 inches, and the small Mississippi kite have bluish-gray plumage. They are all remarkable for their gracefulness of flight and power of gliding in the air. (*See* Hawk.)

KITES. Before the weather man can make his daily forecast he has to hear from the professional kite flyers at the government weather bureaus. Great box-kites carrying instruments for recording conditions in the upper air are sent up from one to three miles high. When it is desired to reach a height much over a mile several kites are used, attached at long intervals to the same steel wire. A train of ten kites with 8½ miles of wire has raised instruments to a height of more than four miles.

This is only one of the many practical uses of the kite, which we usually think of only as an interesting toy. Long before Benjamin Franklin with his famous kite and key drew electricity from a storm cloud, kites had been used for mechanical purposes. Ancient Korean and Chinese stories tell how kite strings carried cables over streams and chasms and so made passage for armies.

Even today kites are used in a similar way. Some of the greatest suspension bridges have begun from lines carried across a river by kites. Many a life, too, has been saved by kites which carried life lines

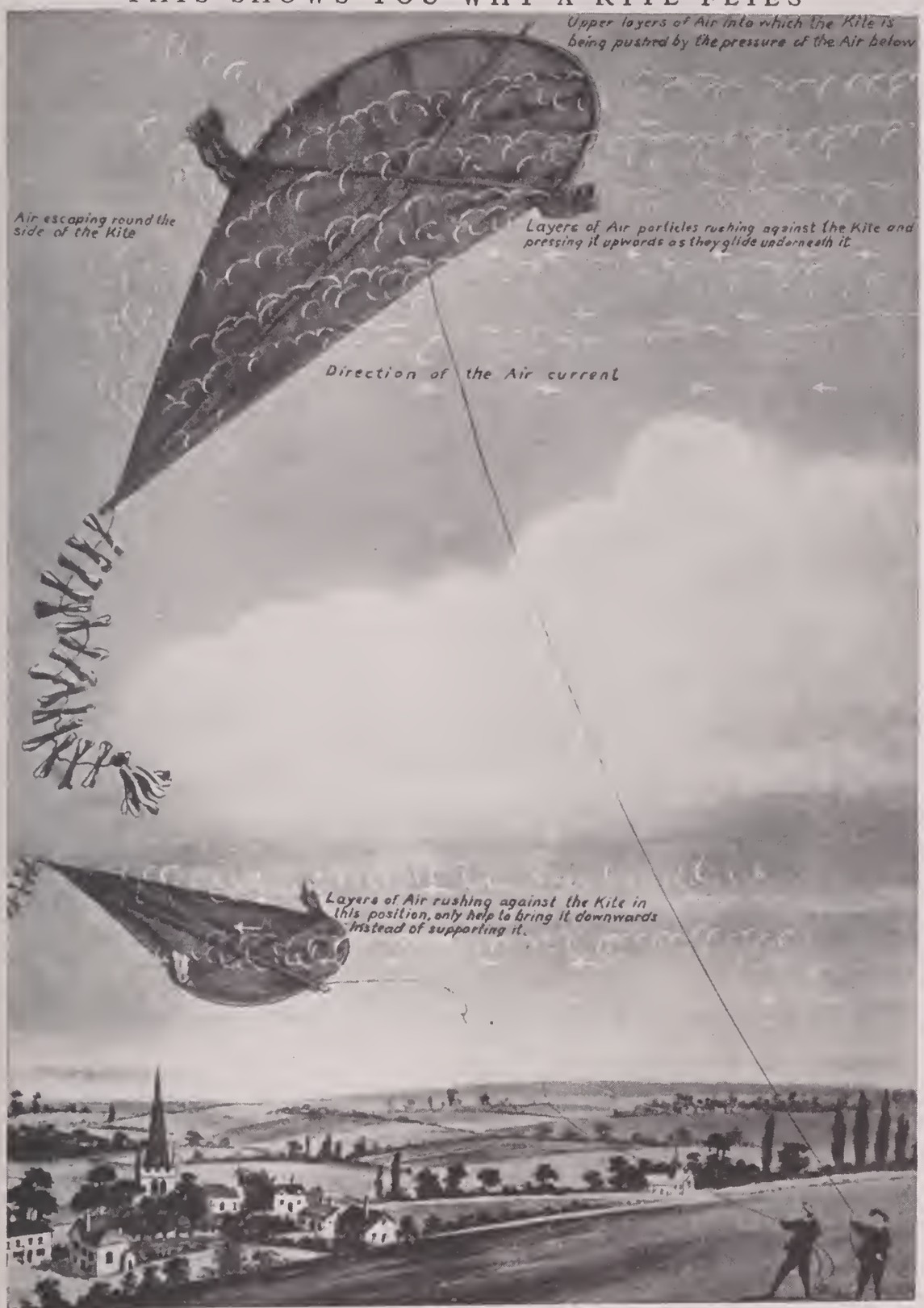


How to Make a Box Kite

To make a box kite prepare four light smooth sticks of spruce or pine, each 36 in. long, ½ in. wide, and 3/16 in. thick; these are the corner sticks of the frame (Fig. 1, *A*). For the covers obtain two sheets of stout paper or cloth, 65½ in. long and 10 in. wide; this allows 1½ in. for pasting (Fig. 1, *B*). You will also need four notched cross braces (Fig. 1, *C*), each 21⅞ in. long, to hold the corner sticks in place when the covers are stretched in place.

When these materials are ready, paste or glue together the ends of each cover strip, overlapping 1½ in. (Fig. 2). When dry, put into one of the cover bands thus formed two corner sticks at *a* and *b*, first gluing them on one edge. Allow these to become nearly dry; then repeat the process, and you have Fig. 3. Now mark on both cover bands the exact center between the sticks, and glue the remaining corner sticks (*c* and *d*) in place in the same manner (Fig. 4). Allow the glue to dry thoroughly; then lift the sticks *a* and *c*, and sticks *b* and *d* will swing down and form a perfect square, as in Fig. 5. You are now ready to spring the cross braces into place. Bind string over the notches to prevent splitting (Fig. 5, *D*). At the center of each cover band fit the notches over the corner sticks (which should stand out diagonally), and spring the braces tight. Then tie them where they cross. Now fasten the slack bridle on the frame at *h* and *i*, and half-way back of *f* and *g* on the first cover (Fig. 6). Tie the kite line where the bridle strings cross, and your kite is ready to fly (Fig. 7).

THIS SHOWS YOU WHY A KITE FLIES



The important thing in kite flying is that the strings hold the kite against the air in a diagonal position. Then the rush of air against it acts like a wedge, tending to push the kite upward and backward. The string keeps the kite from going back, so it rises.

to stranded ships. Kite photography is common, the camera being fastened to the kite frame and worked by a string. Man-lifting military kites have been used to a certain extent for observation and signaling. In the United States Army a train of three to six canvas-covered spruce-framed kites from nine to twelve feet high is used. The observer, like a sinker on a fish line, is fastened to a swing just below the lowest kite. Small pilot kites are first flown to lift the man-supporting kites. For observation and military purposes the airplane and "kite" or "carriage" balloon have largely superseded kites.

In Eastern countries kite-flying is an ancient custom and popular pastime. What horse-racing is to England, and baseball is to the United States, kite-flying is to Korea, Japan, and China. Korean men, women, and children, from the king downward, fly kites during the first days of the new year, and in China "Kites' Day" — the ninth day of the ninth month, is a great holiday. In China and Japan this favorite toy is made to represent gorgeously colored birds, insects, or flowers, as well as in many highly decorated geometrical forms. In some parts of the East kite-fighting is a favorite sport. The strings near the point where the kite is attached are covered with glue and bits of glass, so that a player who has maneuvered his kite to windward of his opponent's can cut the cord of the other kite with a sudden jerk.

In some cities of the United States kite tournaments are held as part of school athletic contests. Prizes are awarded for points such as strength of

pull, high flight, artistic effect, feature flight, and distance flight dash. In the latter, kites fastened to measured string are flown to the end of the line, and drawn back to goal.

Kites are of two general classes, the plain surface and the box kite. Each has many varieties, and there are also combination kites using both the plain and box construction. Compound kites may have their several kites on one string, or on individual lines connected to a main line. Tailless kites are the most popular, though a large, flat-surface kite requires a balance that may be best given by a tail. The box kite is a square frame made of four sticks, one at each corner; and four braces, two near each end of the kite placed diagonally across the inside from one corner stick to the other. The covering is either of paper or cloth.

The flying of a kite depends upon the same principle as the sailing of a boat or the soaring of an airplane. In the case of the airplane, the wind is "created" by the speed with which the machine drives itself through the air. In the same way a kite can be flown on a perfectly calm day if it be towed from a bicycle or an automobile moving at a smart pace.

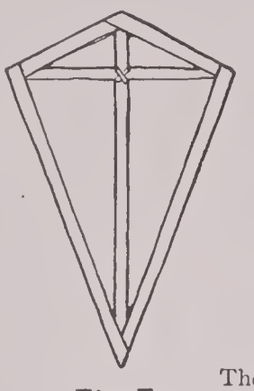


Fig. 3

The principle is this: The current of air, moving horizontally, strikes the face of the kite, tending to drive it backward. If the kite were free it would be whirled away and would fall of its own weight. But the string holds it, so that the force of wind, caught upon the *inclined surface* of the kite, thrusts it upward, much as a wedge thrusts up an object under which it is driven. In addition to this thrust from below, the rush of the wind around the sides of the kite creates a partial vacuum on the upper side. This tends to "suck" the kite upward. The same phenomenon on a greater scale takes place in the flight of an airplane (*see* Airplane).

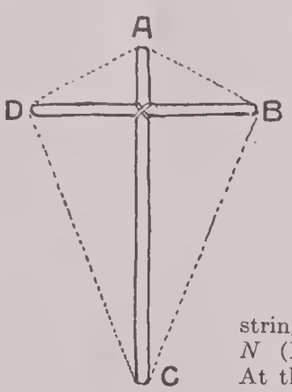


Fig. 2

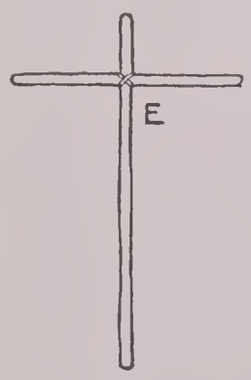


Fig. 1

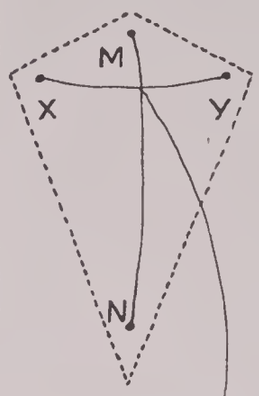


Fig. 4

Fig. 5

How to Make Plain Kites

The simplest kite to make is the plain surface kite over a two-stick frame, as shown in the diagram. Such kites may be from one foot to thirty inches high. The frame is made of two sticks of soft tough wood, a shorter crossing a longer vertical one above its center (Fig. 1). At the crossing point, *E*, the sticks should be fastened with small brads, or lashed with a light-weight string. A strong twine tied at point *A* is stretched around the frame, passing through notches or slits at *B*, *C*, *D*, and fastened again at point *A* (Fig. 2). Cover the frame with light strong paper or cloth, pasting or sewing it over the string edges (Fig. 3). This cover, which should be cut an inch larger than the frame, must not be stretched too tight. Next, fasten a slack string from *X* to *Y* and another from *M* to *N* (Fig. 4). These form the kite bridle. At their crossing point the kite line should be fastened. Now your kite is ready for flight. If it dives and sways, it needs a tail made of twine with bits of paper or rags tied several inches apart (Fig. 5). The length of the tail must be adjusted to the weight of the kite and can be determined by experiment.

KLONDIKE. A gold-mining district in Yukon Territory, Canada, lying chiefly to the east of the Yukon River. It was the scene of the great gold rush of 1897, when a barren waste was suddenly transformed into a busy mining region. As the rich placer deposits became exhausted the population greatly declined. The Klondike River, which gives its name to the region, is a small tributary of the Yukon. The principal town of the region is Dawson, with a population of 3,000, less than a third of its former size.

Modern mines now seek the underground deposits, and the pack trails of older days are supplemented by a railway from Skagway to White Horse, at the headwaters of the Yukon. Mean temperatures in the Klondike region range from −20° F. in December to 60° F. in July. (*See* Yukon Territory.)



KNIGHTHOOD. A knight in armor would present a very strange appearance on a modern battlefield. His prancing steed and coat of mail, the heavy iron helmet which covered his head, the shield which he carried on his left arm, his lance and shining sword—all these belong to bygone days and have little place amid the storms of shot and shell and labyrinths of sunken trenches and barbed wire entanglements of modern warfare. Knighthood flourished before the time of guns and gunpowder, when battles still were won by hand-to-hand conflicts of heavy-armored knights. Fighting was almost an every-day occurrence, and the common people generally could not protect themselves against an invading foe. In times of danger they fled to the castles or strongholds owned by the nobles. To obtain protection the poorer folk became the serfs or villeins of their powerful neighbors, and those in turn were the vassals of those still more powerful; and closely connected with this feudal system, as it was called, we find the institution of knighthood.

The education of a knight began at the age of seven, when he was taken from his home and sent to the castle of some famous nobleman, perhaps his father's lord. Here until he was 14 he served the lord and lady as a page. It was his duty, and he esteemed it a privilege, to accompany them at all times. He waited on them at table and went with them to the chase. He received religious instruction from the chaplain, training in arms from the squires, and was taught by his mistress and her ladies to honor and protect all women. He also learned to sing and to play the lute, to hunt and to hawk. But above all else he learned to ride a horse.

At the age of 14, he became a squire. He now learned to handle sword and lance, and to bear the weight of the heavy armor. In addition to other duties, he had now to carve at table and to accompany his knight to war. He assisted him in putting on the heavy armor. He saw to it that the knightly sword and other arms were polished until they shone. He stood by to give aid in conflict should his lord be overmatched; to lend his horse should the master lose his own. It was the squire who raised his knight when he fell, and who bore his body away if wounded or killed in battle.

In the Prologue to the 'Canterbury Tales', there is this beautiful description of a squire: "His clothes were embroidered red and white, as it were a meadow of fresh flowers. All the day he was singing or playing upon a lute, he was as fresh as the Month of May. His coat was short, with long wide sleeves. Well could he sit a horse and ride, make songs, joust and dance, draw and write. He loved so ardently that at nighttime he slept no more than a nightingale. He was courteous, modest, and helpful, and carved before his master at table."

At the age of 21, if as page and squire he had well acquitted himself, the young man was made a knight. This was an occasion of elaborate ceremony and solemn vows. After a bath of purification, the candidate for knighthood knelt or stood all night in prayer before the altar on which lay the precious armor which he would don on the morrow. In the morning there was a religious ceremony, with perhaps a sermon on the knight's duty to protect the weak, to right wrongs, and to honor women. Then in the courtyard in the presence of the assembled knights and fair ladies, a knight's armor was buckled on, piece by piece, a sword was girded about his waist, and spurs were attached to the candidate's feet. He then knelt to receive the accolade. This was a blow upon the neck or shoulder, given by the officiating lord or knight with his fist or with the flat of a sword. As he gave it he said, "In the name of God and St. Michael and St. George, I dub thee knight; be brave and loyal." The ceremony was followed by exhibitions of the young knight's skill in arms.

Sometimes on the occasion of a knighting, the lord at whose castle the ceremony took place gave a tournament. This was often a very gorgeous and extravagant entertainment. Knights for miles around were invited to come and take part, while many persons of distinction came to see the events. Sometimes the visitors came in such numbers that the lodgings of the castle were filled and tents were put up for the later arrivals. The shield with its coat of arms served as a sort of doorplate to the passersby, who when they saw a familiar device displayed, would say, "Sir Percival is within this tent."

EQUIPPING THE YOUNG KNIGHT FOR ADVENTURE



What a proud moment it must have been for the family of a young squire when the time came for him to put on the honored armor of a knight! This picture shows a "try-on," with the armorer fitting the metal "garments" with the aid of hammer and pincers. In a few days the squire will be "knighted" with elaborate ceremonies.

In the morning after attending mass, the knights would go to the tourney field or lists. Here the combats or jousts between the knights were fought. Sometimes two knights fought alone, sometimes whole companies met in combat. When all were assembled, the heralds announced the names of the contestants, and the new knight looked upon the most brilliant scene that the times had to offer. Along the sides of the field were handsome pavilions filled with beautiful ladies, gay young pages, and jewel-bedecked nobles. The knights were resplendent in shining armor, with swords like silver and golden spurs giving back the sunlight. Banners fluttered everywhere and here and there gleamed gorgeous cloth of gold.

The combats which took place in this gay setting were not gentle ones. The points of the weapons, to be sure, were usually encased in blocks of wood to make the encounter less harmful, but the sport was so rough and the knights jousted in such earnest that many were wounded and occasionally were killed. About each knight's helmet was tied the favor his lady had given him, and he fought to do her honor quite as much as to do himself credit. The joust was attended by much excitement, with the blowing of trumpets, the clash of steel, the shouts of heralds,

and the applause of the spectators; and it continued until one or the other of the knights was overcome. The defeated knight then yielded his horse and armor to his adversary and was assisted from the field by the squires.

Sometimes a tournament lasted for several days, feasting, dancing, and hawking filling the hours not given to fighting. Hawking was a sport indulged in by the ladies and the squires as well as by the knights; and almost every lady had her own hawk or falcon which when unhooded was trained to rise into the air and attack game birds (*see* Hawk).

Often during the festivities of a tournament a large pie was baked and live birds concealed inside. Then in the great hall the pie was opened, the birds flew about, and the falcons were loosed at them. This was considered great sport, and has been immortalized in the nursery rhyme—

> Sing a song of sixpence, pocket full of rye,
> Four and twenty blackbirds baked in a pie;
> When the pie was opened, the birds began to sing;
> Wasn't that a dainty dish to set before a king?

Into the Great World of Adventure!

After the festivities attending the conferring of knighthood, the young knight was free to go where he pleased. Usually he rode forth in quest of adventure, armor on his back, his spurs on his heels, and with sword, shield, and lance ready to hand. As a knight-errant he sought a fair maiden in need of a champion, or a strange knight with whom to joust. Sometimes he stationed himself at a bridge or crossroad to challenge to combat any knight who happened by. He was usually sure of hospitality at any castle to which he came. After a time he might return to his father's castle or join the following of some great lord, or become one of the multitude of crusaders who journeyed to rescue the Holy Sepulcher. Whenever or however he went he took with him the three watchwords of a knight: Religion, Honor, Courtesy. The ideal knight is thus described by the poet Chaucer: "And though he was valorous, he was prudent and as meek as a maid of his bearing. In all his life he never yet spake discourteously but was truly a perfect gentle knight." But only too often, alas! knights were false to those high ideals.

With the rise of the longbow and the crossbow carrying wounds or death from a distance, and the invention of gunpowder and cannon rendering useless the frowning feudal castle, the knight in armor passed out of existence. Knighthood then came to be merely a title of honor conferred for valuable service rendered to the king or state, with the title "Sir" as its only distinction. In recent times in England, it has been conferred on eminent scholars, lawyers, physicians, artists, and civil officers, as well as on soldiers. The United Kingdom has eight of these honorary orders of Knighthood—the Garter, the Thistle, St. Patrick, the Bath, Star of India, St. Michael and St. George, Indian Empire, and the Royal Victorian Order. (*See* Armor; Castle; Feudal System.)

KNIGHTS OF COLUMBUS. This great Roman Catholic fraternal organization was founded in New Haven, Conn., in 1882 by a Catholic priest, Michael J. McGivney. Its purpose is to provide insurance for its members, to assist those who are sick and disabled, and in general to promote and protect Catholic interests. Membership is open to Roman Catholic men only. The association now has a branch in every state in the Union and in every Canadian province, with a total membership of more than 400,000. It is governed by a supreme council, members of which are elected by the various state councils. During the World War it performed effective service to American troops in training in the United States and in the camps and on the battle lines in France and Italy.

KNITTING MACHINES. During the great World War, women and girls everywhere were fashioning knitted socks, scarfs, and sweaters of khaki or gray yarn for the soldiers. It was fascinating to watch their deft fingers, thrusting needles of steel or bone through loops of yarn, catching the yarn and forming new loops, and transferring the rows from one needle to the other until the whole fabric was completed. This art is very modern as compared with weaving, for no allusion is found to knitting until after the year 1400.

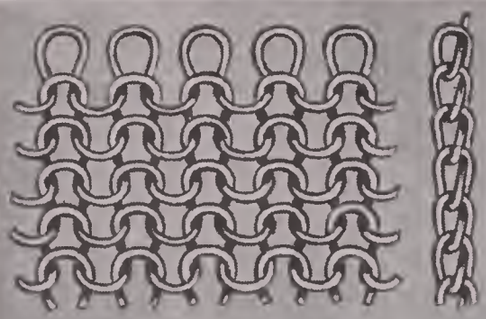
The Rev. William Lee of Nottinghamshire, England, who lived about 200 years later, watched knitting needles flying in this fashion, building up a garment very slowly, for all their flashing speed. He believed he could make a machine which would do this work much more quickly. Instead of two or three single needles, his machine had as many needles as there were loops, so arranged that they formed and gave off the loops alternately.

Queen Elizabeth's Silk Stockings

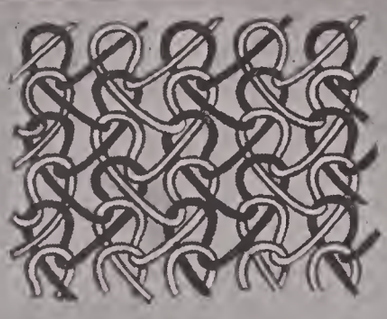
The inventor made a pair of stockings for Queen Elizabeth, but she was disappointed because they were of coarse worsted and not silk. So Lee made another machine which had 20 needles to the inch instead of 8, and with this he knitted a pair of silk stockings for the queen. Although Elizabeth was pleased with them, she did not give the inventor a patent or any assistance, and he took his machine to France.

But the use of Lee's invention spread in England, and from it has come the wonderful and complicated knitting machinery of today, which produces the great quantities of hosiery, underwear, sweaters, cardigan jackets, gloves and mittens, hoods and scarfs, shawls and leggings, jerseys and tights, and many beautiful new materials, such as silk jersey, tricolette, etc. The modern machines are so very complex that even looms which weave the most intricate patterns cannot be compared with them. Sometimes as many as five sets of machines are required to make a single garment, and if we examine any knitted garment we will see that oftentimes the work must be supplemented with sewing machines.

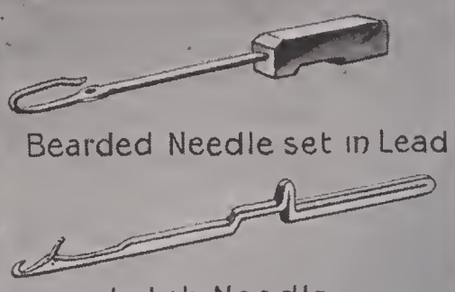
THE CLEVER MACHINES THAT KNOW HOW TO KNIT

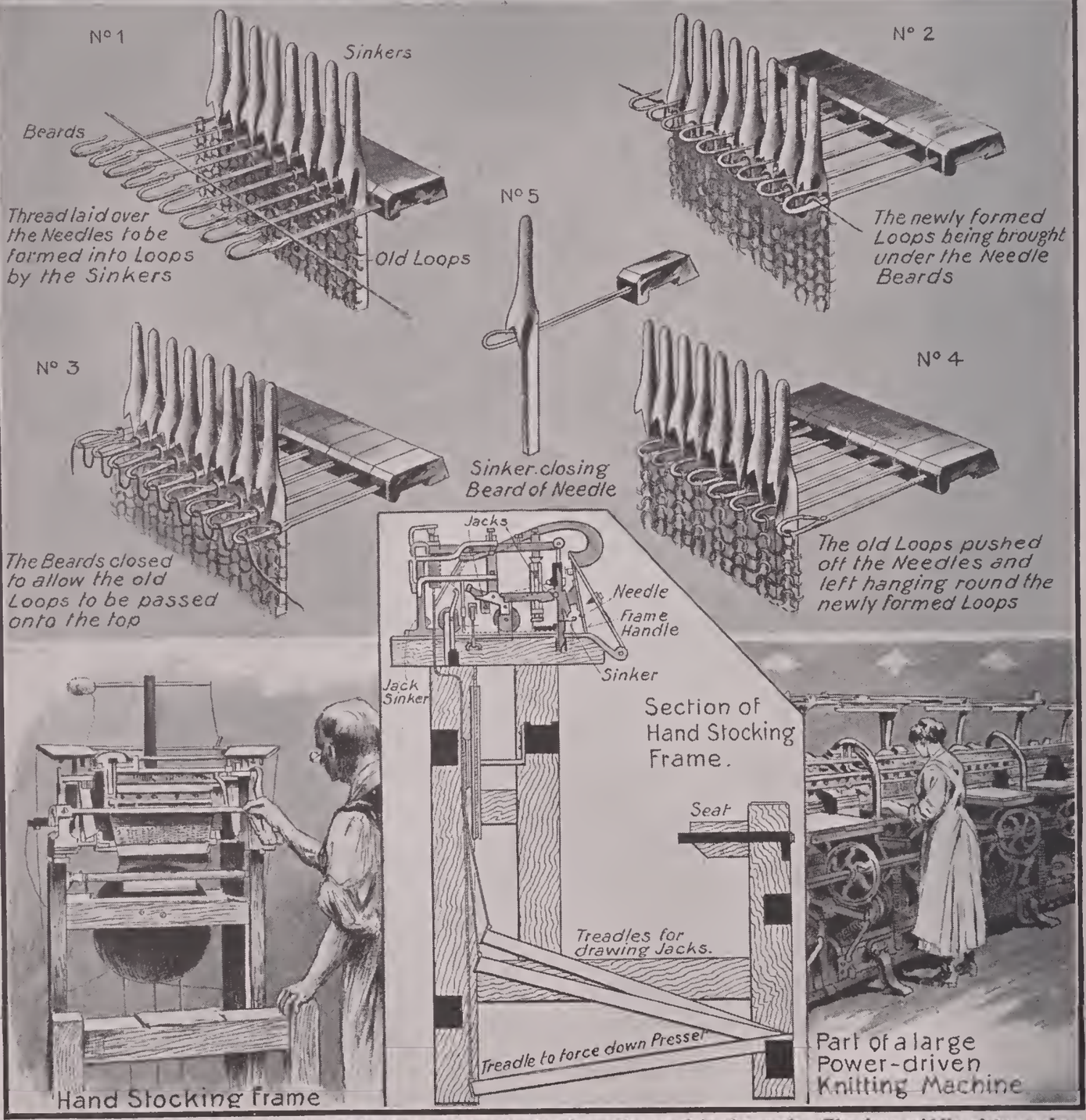


How the Loop is formed in Plain Knitting



Formation of Loop in Warp Knitting





The top pictures show different styles of knitting and two kinds of needles used in the work. The four middle pictures show "framework knitting" with one continuous thread: 1. The thread lies across the needles ready for the next row. 2. The sinkers come forward and dip to loop the thread, at the same time closing the beards of the needles, as shown (5) in the center. 3. The sinkers rise again and push the old loops off the needles. 4. The row is completed. The pictures at the bottom show the old hand frames and the newer types of power-driven machines.

For any subject not found in its alphabetical place see information

The old machines knitted their webs flat, and stockings required to be sewed up at the back. Circular knitting machines were first produced in 1816. They are now used more than any other because of their greater speed and capacity. Set close around the circular frames are hundreds of little needles which seem to rise one after another, apparently of their own accord. They catch the yarn, pull it down through another loop which is just slipping off their peculiarly shaped heads. The head of this needle, after the first loop is safely off, opens and holds the new loop until the next one comes down through it to take its place.

"Framework" and "Warp Knit" Fabrics

Machine-knitted fabrics are of two kinds, known as "framework knit" and "warp knit." In the first, one continuous thread is looped over and over, the loops supporting themselves, just as in hand knitting. Warp knitting is made by interlooping parallel threads, as many threads being used as there are loops in the width of the fabric. The former is used in making hosiery, underwear, sweaters, etc. The latter, because it gives greater scope for reproducing designs and color, is used in shawl-making, glove-making, and fancy hosiery.

It is not difficult to distinguish between the two. If a thread of framework knitting is broken the whole fabric can be unraveled by pulling it. If, instead, a broken thread unravels a line straight down its length—as when a "run" develops in your best stocking—the material is warp knit.

Modern Developments in Knitting

The modern knitting machines are power-driven and entirely automatic. The needles, which slide in grooves, and are raised and lowered by little V-shaped cams which move around the machine beneath them, are dropped or added as the material is to be narrowed or widened. Fancy ribbed effects in the tops of sports hose, etc., are made with a Jacquard attachment. (*See* Spinning and Weaving.) Some of these wonderful machines are capable of making more than a million loops in five minutes, and their action is so nearly automatic that one person can look after several machines at once. Knitting by hand, a person working steadily can turn out one stocking a day, but a modern stocking machine will turn out a hundred pairs in the same length of time.

Knit goods differ from woven goods in that the latter are made up of two complete sets of threads intersecting at right angles, while a knitted fabric is made up by looping one continuous thread or interlooping a series of parallel threads. The valuable qualities of knitted goods are their elasticity, which makes them fit snugly, and their porousness; both characteristics make them suited for underwear.

KNIVES AND FORKS. Only 300 years ago forks were great curiosities in England and most other countries. Table knives, too, were rare, and large portions of food were cut up with the knife which each person carried with him in his stocking or his belt.

But though table knives are comparatively recent, knives for general purposes were one of the first inventions of early man. Some dating back to the Stone Age have been found, made of flint, and very similar to the arrow heads and the hatchets the Indians were using when the white man came to America. Spoons, too, have been in use a long time. In museums we often see spoons of wood, stone, and ivory which were found in ancient Egyptian tombs. The Greeks and Romans used spoons of bronze and silver, and during the Middle Ages spoons of bone, wood, and tin were common; the wealthy had spoons made of beaten silver. Forks came long after knives and spoons, and were long used only in cooking or for holding the joint of meat while it was being carved. The first forks were two-pronged affairs, much like our carving forks, and were made of iron, bone, or even hard wood.

The use of the fork at table seems to have been introduced into Europe from the Orient through Venice. A story of the 11th century tells of the wife of a Venetian ruler who was "luxurious beyond belief," because, "instead of eating like other people, she had her food cut up into little pieces and ate the pieces by means of a two-pronged fork." When the custom of using a dining fork was brought to England in 1608 by a traveler who had observed it in Italy, it caused a great deal of excitement. He was laughed at by some, and railed at by others, one person declaring that it was an "insult to Providence, who has given us fingers." Even today forks are not used in many parts of the world. The Persians and the Egyptians, for example, think the European method of eating very queer; and most of the Chinese and Japanese use chop-sticks.

Most American cutlery is made in Massachusetts, New Jersey, New York, New Hampshire, Connecticut, and Ohio, but the United States has no great cutlery manufacturing center such as exists in England, France, or Germany. Sheffield, England, has long been famous for the high quality of its cutlery since the days of Chaucer.

The making of fine steel knives is a complicated process. In the first place the steel must be very hard, and carefully forged, tempered, and ground. Putting the knife into its handle of horn, bone, ivory, tortoise shell, celluloid, or silver, known as "hafting" the blade, is such a delicate task that it is a special trade. Silver-plated ware is made by electroplating some cheaper metal, which has been shaped and cut with dies. (*See* Electroplating.)

KNOTS, HITCHES, AND SPLICES. A scientist who wanted to test the intelligence of monkeys once cut the rope which held up the swing of his pet chimpanzee. The ape fretted and grieved over it, but it never occurred to him to mend the rope with a simple knot. Tying knots is indeed a special accomplishment of mankind. You might almost say that if you trace the thread of civilization you will find it fastened in many places with knots—from the naked savage tying a crude hook to his sea-weed fishline, to the dock-hand mooring a great ocean liner to its pier with giant hawsers.

To know how to tie knots properly saves much time and trouble, and in some cases even lives depend upon it. The sailor aloft in a ship's rigging, the cowboy roping a wild steer, the steeple-jack dangling high in the air, the lumberman balancing on a logboom—all of them know what will happen if a knot slips.

Some knots are valuable because of the speed with which they can be made. But the best knots are those that hold firmly without slipping, yet do not bind so tightly that it is hard to untie them when their work is done. Most of the simpler knots which are described below meet this requirement.

Knots

When a rope is bent in a loop, the looped part is called the *bight*. The long portion of the rope is known as the *standing part*, and the short part, used in forming the knot or hitch, is known as the *end*.

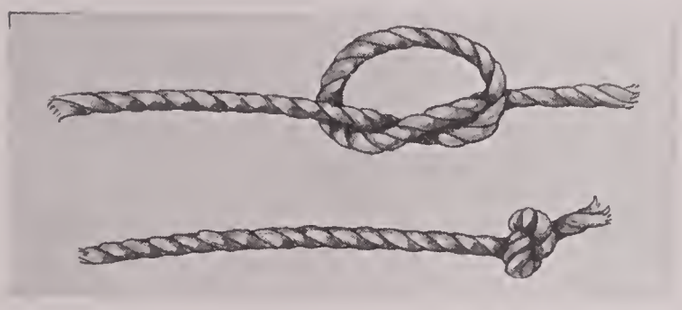


Fig. 1.—Overhand Knot

Standing part of the rope is held in the left hand and the end is passed back over it, and put through the loop just formed.

The simplest knot that is made is the overhand knot (Fig. 1). It forms a part of many other knots. It is used to keep the end of a rope from raveling, to provide a hand-hold on a halter or bell rope, to prevent the end of a rope from running through a pulley, or a sewing thread from pulling through cloth. The square or sailor's knot (Fig. 2A) is the commonest of all knots for fastening ropes or strings together. When correctly made, it is as perfect as a knot can be, for it is reliable, and unties easily. If we tie our shoe laces correctly, we use this square knot, although the ends are not pulled clear through but are looped and drawn tight. When a square knot is tied without a single or double bow, we call it a "hard" knot. Its one disadvantage is that it will not hold so well when made with ropes of different sizes. This knot is always used when the sailor reefs the sails, for even with stiff wet ropes it can be loosened easily by pushing the free ends back against the knot, and completely untied by pulling at the loops which appear.

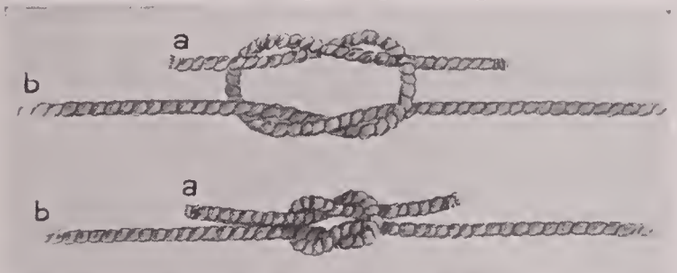


Fig. 2A.—Square Knot

The illustration shows the proper way to tie two pieces of rope together. The ropes are passed once around each other. The ends are then brought up and the process repeated, care being taken that on each side the standing part and free end (a, b) come out on the same side of the loop. When drawn tight, the free ends will lie parallel to the standing parts.



Fig. 2B.—Granny Knot

This unreliable knot results when the second twist, instead of following the square knot rule, is made in the reverse direction, so that the parts (a, b) are separated from each other by a part of the loop. When this is drawn tight the ends stick out at right angles to the knot.

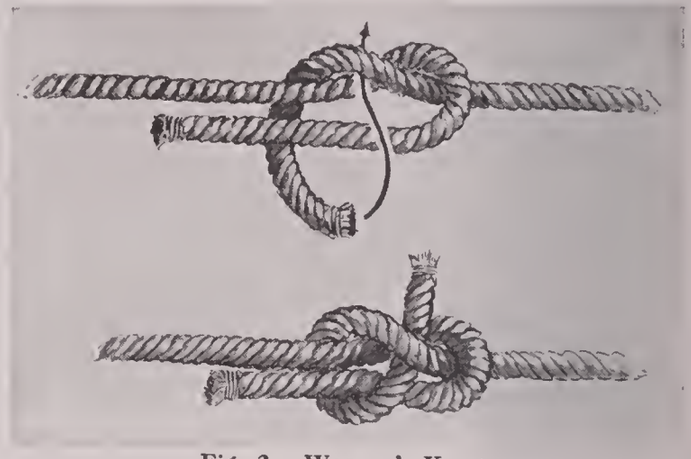


Fig. 3.—Weaver's Knot

This also begins like a square knot, but one of the ends thrust back under itself and comes out at right angles to the knot.

Sometimes when we are tying our shoe laces we make a mistake and instead of making a square knot, we get the troublesome granny or lubber's knot, which slips easily and gives way under a strain (Fig. 2B). Many people go through life with their shoestrings always dangling without realizing that they are making themselves much useless trouble by not learning

Fig. 4.—Running or Slip Knot

A bight is first formed and an overhand knot made around the standing part.



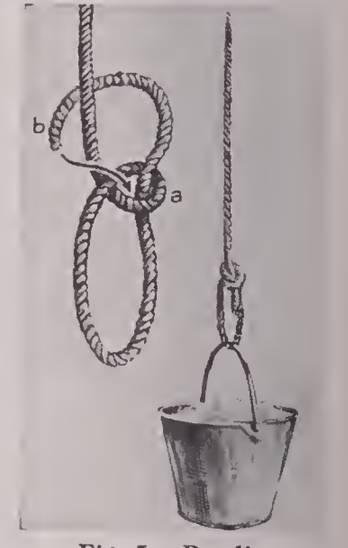


Fig. 5.—Bowline

Make a loop (a) and pass end (b) through it. Now carry end as indicated around the rope above the loop and then back through the loop again, and draw it tight. When tying an animal or fastening a rope to a bucket, the end (b) is first passed around the animal's neck or around the bail of the bucket, before going through the loop (a).

the difference between these two knots. The weaver's knot is another knot for tying ends of rope together (Fig. 3). Weavers use it to tie together ends of threads, as it passes smoothly through the needle. One of the simplest "eye" knots is shown in Fig. 4, and is known as the running or slip knot.

The bowline is one of the best and most useful of all the knots; indeed it is often called the king of knots (Fig. 5). It will not slip and is widely used—on the farm, in construction work, by mechanics, and in nearly every line of industry. It is the safest knot to put around an animal's neck. It is often used in fastening a rope to a bucket to hoist material, such as tools or mortar, to workmen on a scaffold. A close relative of this knot is called a "bowline on a bight" (Fig. 6). Being made with a loop or bight of the rope, it is much stronger and does not require the use of either end of the rope in tying it. With this knot a man can be lowered in safety from a great height.

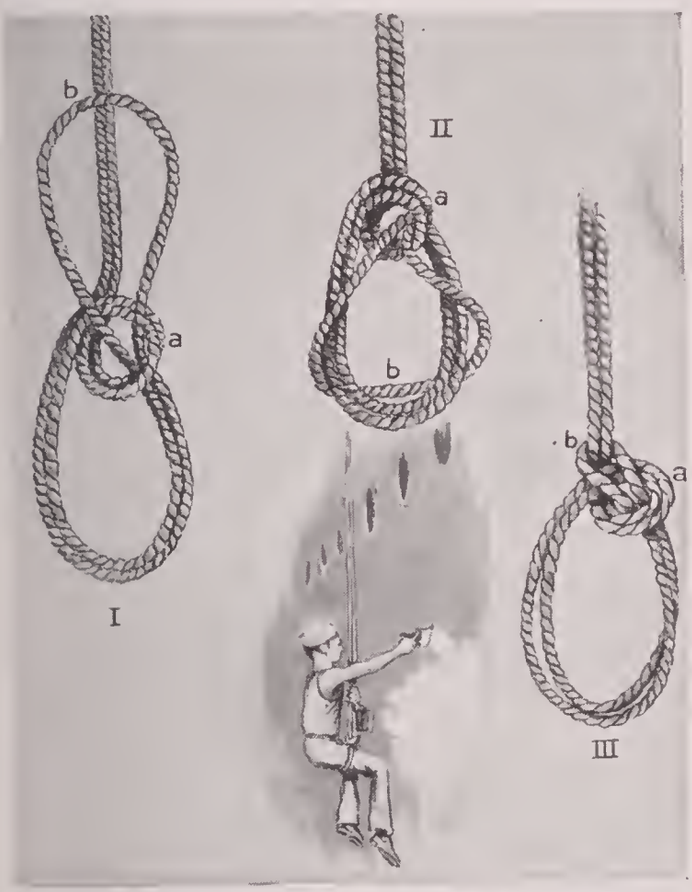


Fig. 6.—Bowline on a Bight

Make a loop (a) and pass the end of the bight (b) through it as in Part I. Now hold the loop in the left hand and pull the bight down and around the hanging part as in Part II. Now raise the bight (b) up above the loop (a) and draw it down tight as in Part III.

Sailors paint the sides of a ship swinging comfortably in the loop of this knot. It is used also to hold ships to their mooring posts.

Hitches

Although there is no sharp distinction between knots and hitches, the name "hitch" is usually applied to those temporary devices which are not, as the sailors say, "made fast." A knot is thus the more permanent fastening. Another difference is that a knot may be made in the rope itself without requiring anything else for its security. A hitch, on the other hand, usually takes the form of self-binding loops around some solid object, and will come loose as soon as the strain is removed. The sheepshank is the most practical and satisfactory way for shortening a rope without cutting it and many times this hitch proves of use to sailors (Fig. 7).

The halter hitch has many uses, the most common one being to fasten the halter ropes of horses or cows to the manger or to a post or hitching ring (Fig. 8). When a halter hitch is properly made, it will slip tight, and therefore should never be used around an animal's neck. An even better halter tie is shown in

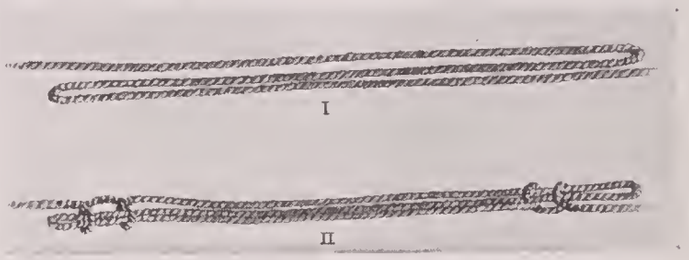


Fig. 7.—Sheepshank

Fold rope back on itself forming a double loop of the required length (I). Then weave a clove hitch (Fig. 11) with the standing part of the rope over each end of the double loop (II), and draw tight.

Fig. 9. This is called the "figure eight" tie, and no matter how tight it has been drawn by the animal, it can easily be untied by jerking the loose end of the rope.

The clove hitch, the best known of all the hitches, is easy to make and the harder the pull against it the tighter it holds. The foundation of it is the *half-hitch* (Fig. 10, I). It is, in fact, sometimes called the "double half-hitch." It will serve well as a fastening whenever the rope is to have a constant and steady

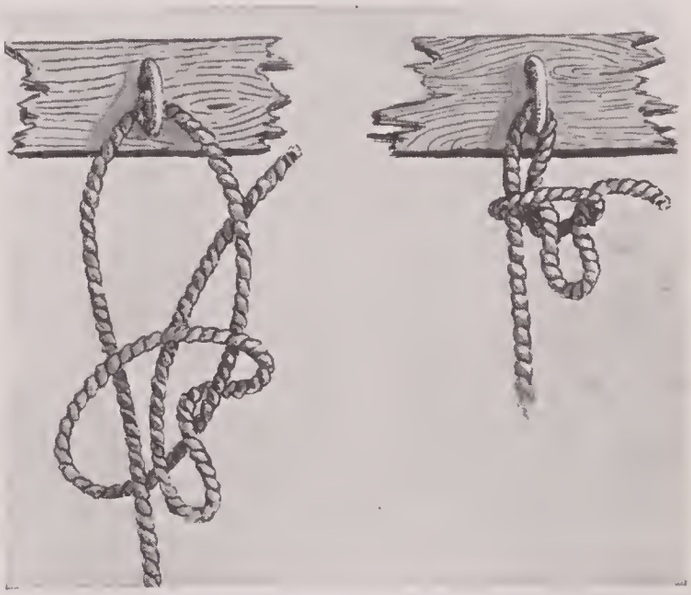


Fig. 8.—Slip Knot Halter Tie

Put end of halter rope through ring or hole in manger, then tie a slip knot as in Fig 4, except that the end of the rope is not pulled all the way through, but is left to form a loop.

strain upon it. It is always easy to loosen it, even

when made with a hard wet rope. In Fig. 11 the clove hitch is used to make a running noose.

Splicing a Rope

Few people know how to splice a rope, yet a knowledge of splicing is valuable in many ways. A

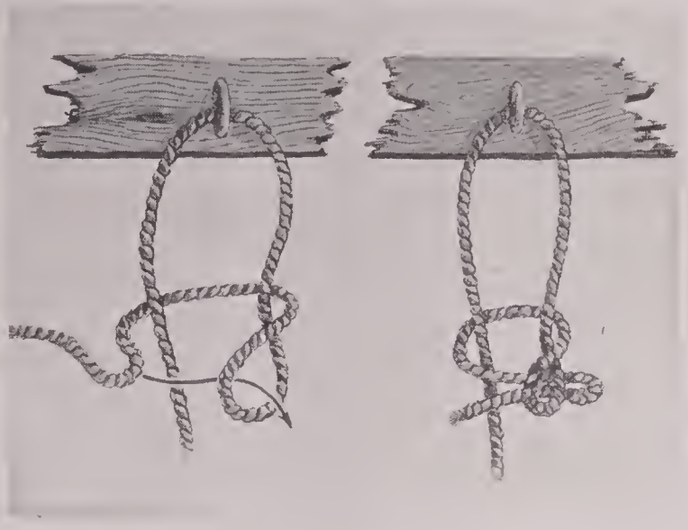


Fig. 9.—"Figure Eight" Halter Tie

The difference between this knot and plain halter tie lies in the extra twist given the first loop, before the second loop passes through it.

worn or broken rope can be neatly mended by this means, and a good splice is always stronger than a knot. Splicing is necessary if the rope is to pass through pulley blocks where knots cannot be used.

The simplest type of splice is the short splice. In making this the strands of each rope are spliced into the strands of the other rope. First the strands

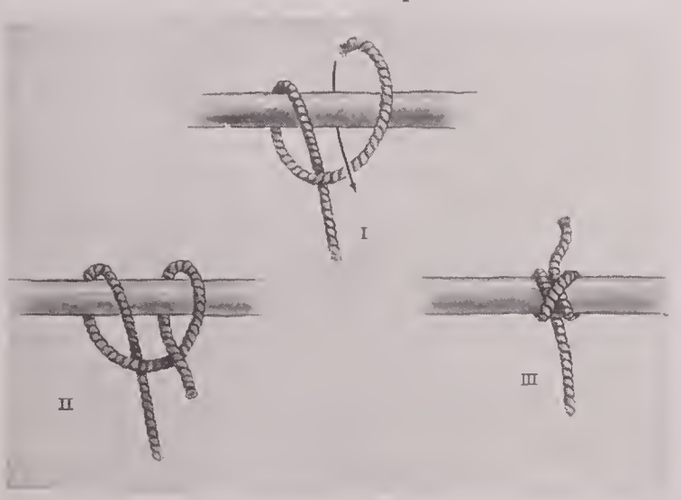


Fig. 10.—Clove Hitch

To put the clove hitch on a stake or other support, the top of which can be reached, make a half-hitch or loop (I), passing the right hand part of the rope under the left. Now hold the first loop in the left and make another one exactly like it with the right (II). Now slip the right hand loop over the left hand loop, and drop the two loops over the stake, drawing them tight. When the clove hitch is put around a tree or high pole, the end has to be passed around and woven under and over to get the same effect.

of each rope are untwisted (Fig. 12). Then the ends are brought together so that strands *a*, *b*, and *c*, alternate between strands *d*, *e*, and *f*. When they have been pushed together as far as they will go (II) they may be tied with a string to hold them in place during the remainder of the operation. Taking one of the strands (*a*, III), it is passed over the twisted strand nearest to it and under the next to it. The same thing is done with strands *b* and *c* in one direction and with *e*, *d*, and *f* in the other direction. The process is repeated (IV) until all the six loose strands have been woven over and under into the solid body of the rope. Care must be taken that the separate strands do not unravel during the splicing. The short splice, of course, makes the joint double the thickness of the rest of the rope (V). In splicing hard-twisted ropes, a pointed peg or "marlin spike" is often used for making the openings under the twisted strands so the loose strands can pass through more easily.

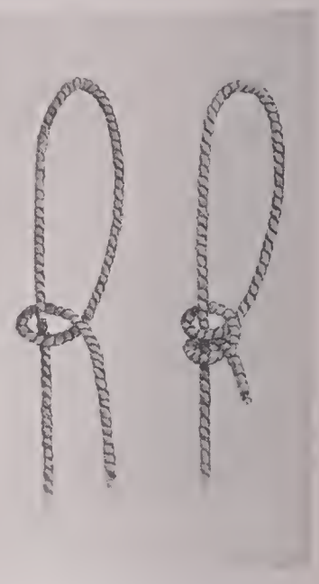


Fig. 11.—The Clove Hitch Slip Knot

In this knot the rope is looped over and a clove hitch is made around the standing part.

The eye splice is made according to the same prin-

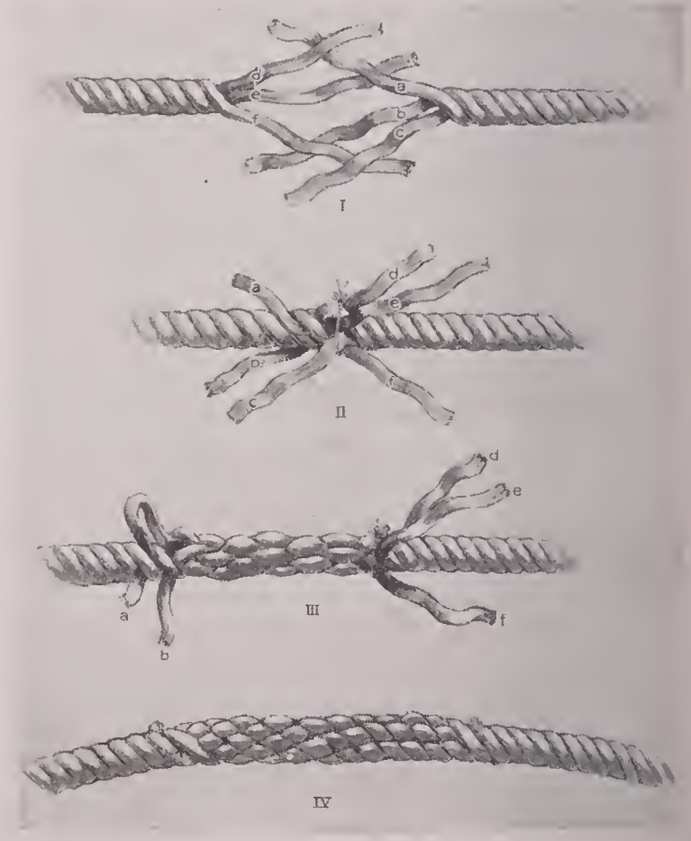


Fig. 12.—The Short Splice

ciple as the short splice, except that the end of the rope is woven back into itself, forming a loop, which in this instance is called an "eye" (Fig. 13). The

rope is untwisted for 6 or 8 inches, and the untwisted ends are doubled back against the main part of the rope to form a loop of the size desired (I). Each of the loose ends is then passed over the nearest strand and under the next (II) until the splice is completed (III). It will be noticed that here, as in the short splice, the loose ends are woven around in the reverse direction from the twist of the body of the rope.

Another common splice is the so-called "long splice." It is used when the rope must pass through a block, and the thick short splice would not pass.

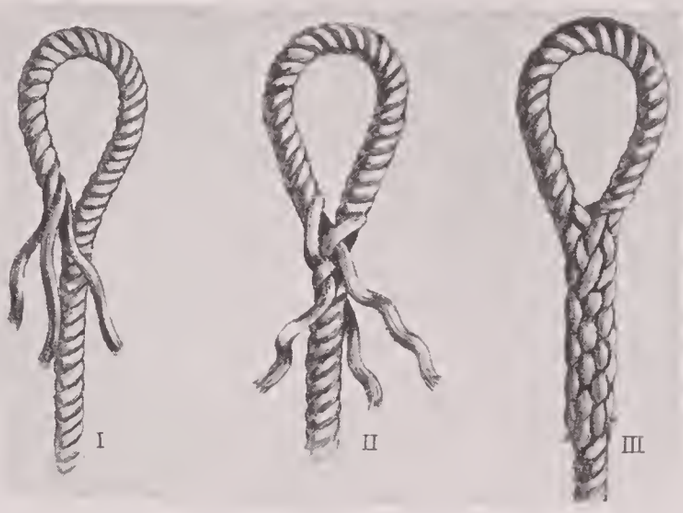


Fig. 13.—The Eye Splice

KNOX, JOHN (1505?–1572). Seldom has a man so imprinted himself upon a nation as did the religious reformer John Knox upon the people of Scotland. When Luther nailed his theses to the church door at Wittenberg, in Germany, Knox apparently was a boy of about 12, attending school in his native Haddington, not far from Edinburgh. Later he attended the university and became a priest.

Nowhere was the church of that day more corrupt and oppressive than in Scotland. The powerful Cardinal Beaton, chancellor of Scotland, atoned for the scandal of his private life by the zeal with which he persecuted heretics. His murder in May 1546 is attributed to revenge for his burning of the reforming preacher George Wishart. Seizing the cardinal's castle of St. Andrew's, his murderers stood siege there, and among the strangely assorted company of sympathizers who flocked to their aid was John Knox, already a hunted man for his friendship with Wishart. Here Knox received a literal "call" to his lifework from the assembled company of reformers, and it was in these stirring surroundings that he first preached his doctrines of reformation.

In June 1547, the castle surrendered to a French fleet, for Scotland was then bound in close alliance with France. Knox and other captives were carried to France and condemned to labor at the oar in the galleys. Released in 1549, he took refuge in England, but with the accession in 1553 of Mary Tudor, that "cursed Jezebel," as Knox termed her, England ceased to be safe for Protestants. The next five years he spent chiefly in Geneva in contact with Calvin and Calvinistic doctrines.

The French regent of Scotland, Mary of Guise, who had earlier felt compelled to temporize with the powerful Protestant party in Scotland, believed herself strong enough in 1559 to defy it, and forbade the reformed preaching. When Knox arrived in Edinburgh, in May of that year, he was by her orders "blown loud to the horn" as an outlaw. He escaped to Dundee and Perth, where his sermons against "idolatry" were like sparks to tinder. The "rascal multitude" rose and sacked abbeys and monasteries, leaving only the walls standing. Civil war followed. To counterbalance the French alliance, on which the regent relied, the Lords of the Congregation, as the Protestant chiefs were called, appealed to England, where Elizabeth now reigned in place of Catholic Mary. Although Elizabeth did not love Scotch Puritanism, and had been deeply offended by Knox's 'First Blast of the Trumpet against the Monstrous Regiment of Women,' a tract arguing against the fitness of women for rule, written during the reign of Mary, policy demanded that she support a movement likely to weaken the hold of France and Catholicism on Scotland. Mary of Guise died almost at the moment of Protestant victory. A treaty signed June 6, 1560, withdrew the French troops and left the Lords of the Congregation the masters of Scotland.

Knox's power was now come to flood-tide. Parliament abolished the pope's authority in Scotland, and forbade the celebration of Mass under heavy penalties. When young Mary Queen of Scots, lately widowed of her French boy husband, returned to Scotland, in 1561, only the drawn sword of her half-brother, Lord James Stuart, secured her the privileges of the outlawed faith in her private chapel. Loud and bitter were the protests of Knox, and Mary humbled herself in repeated interviews with him. Knox, flint to blandishments and arguments alike, left her weeping tears of impotent anger. So began a duel which ended only when the queen, as a result of her own criminal folly in marrying her husband's murderer, had fallen from her high estate and become a fugitive and a prisoner—in the end a martyr—in England. (*See* Mary Stuart, Queen of Scots.)

After preaching the coronation sermon of Mary's baby son James, Knox retired from public life on account of failing health, and died three years later. The deposition of Mary and the rule of a Protestant regent seemed to guarantee that Knox's work should not be undone. Nor was it, for though vexatious strife between "kirk" and crown continued long after his death, Puritan Presbyterianism continues to this day to be the creed of the "established kirk" and the mold of Scotch character. In large part this was due to the deep sincerity and conscientiousness of one who, however harsh, dogmatic, and intolerant he was, "neither flattered nor feared any flesh."

KORAN. On the Koran, the sacred book of the Mohammedans, is based the religion of about 225,000,000 people. The name means "the Reading," or the book to be read. It is used in public worship, is the chief textbook in Mohammedan schools, and is the standard of all law and practice among all devout Mussulmans.

The Koran is regarded by the Moslems ("the faithful") as the word of God revealed to the prophet Mohammed, through the angel Gabriel. Its various parts were written down from the prophet's lips, from time to time, by the prophet's scribes, on dried leaves, bits of leather, whitened shoulder blades of sheep, or whatever else was at hand. After the death of Mohammed these fragments were gathered together, copied, and arranged roughly in the order of their length without regard to content. Thus the book has "neither beginning, middle, nor end." The original writings were then destroyed.

The Koran, which is written in Arabic, is about as long as the New Testament, and is divided into 114 *suras*, or chapters. Each of these begins, "In the name of God, the merciful and compassionate." The book consists of history, legends, prophecies, moral precepts, and laws. The histories are chiefly about Old Testament characters, and many of the doctrines and laws are the same as those of Judaism or of Christianity. Moses, Jesus, and Mohammed are named as the greatest of the prophets sent by God to lead mankind in the path of truth.

The fundamental doctrine is the oneness of God, expressed in the simple statement, "There is no God but God (Allah)"; and submission to His will (Islam) is the highest virtue. Much emphasis is laid also on the Last Judgment, when everyone shall receive reward or punishment for his deeds. The faithful Moslem is commanded to pray five times a day, turning his face toward Mecca, to fast at stated times, to give alms, and to make at least one pilgrimage in his lifetime to Mecca, the sacred city. Both the civil and criminal laws of Mohammedanism are based on teachings of the Koran. (*See* Mohammed.)

The "LAND *of* MORNING CALM"



How would you like to carry a 300-pound barrel of flour on your back several miles for ten cents? That is a sample of the pay these Korean coolies get for their work. With the aid of those wooden racks, they carry enormous loads for great distances.

KORE'A. There is a story that an ancient ruler of Korea—or "Chosen," as it is officially called by the Japanese, meaning "land of morning calm"—once observed that "if men cannot put their heads together they cannot conspire." So he proceeded to stamp out conspiracy by making his subjects wear hats so big that they had to shout to one another! Fanciful as this story is, the fact remains that even now, since the land has become a province of the Japanese Empire, it is "the land of hats"—hats of enormous size and infinite variety, each kind having its own significance. You may still see the peasant, in short white jacket, loose baggy trousers tied at the ankle, wadded socks, and wooden boat-shaped slippers, wearing an enormous white straw hat sloping out over his shoulders like a tent. The Korean gentleman, carrying a parasol of strong oil paper, struts about in a long flowing kimono, and wears a stiff hat of glossy black horsehair or split bamboo, sometimes tied with ribbon under the chin. In former days the single men were not allowed any hats, and must wear their hair in braided queues down their backs; but if a man was engaged to be married he was allowed a compromise hat of yellow straw!

Extent.—North and south, 600 miles; east and west, 135 miles. Area, 84,738 square miles. Population, about 17,500,000.
Physical Features.—Ham-gyong-Do and Kang-wong-Do mountains; highest peak, Pai-shan, an extinct volcano (8,900 feet). Yalu and Tumen rivers in the north; Han and Tai-dong rivers in the west.
Products.—Rice, wheat, and other grains; beans, cotton, tobacco, silk; cattle; gold, copper, iron, coal, and graphite; whale and fish.
Principal Cities.—Seoul or Keijo (capital, 300,000); Pingyang or Heijo (175,000); Fusan (chief port).
Government.—An integral part of Japan since 1910, under a Japanese Governor-General assisted by an Advisory Central Council.

THEY SEEM TO LIKE THATCHED ROOFS!



While there is a great variety of hats among the Koreans, they all agree upon what constitutes a proper roof. It's made of thatch, and while its outline may vary, as you see here, the same general principle prevails whether it be a hut or a palace. It seems strange, doesn't it, to see a modern factory chimney rising from such a curious congregation of low dwellings? That factory is probably run by Japanese, who strive to induce the conservative Korean to abandon his ancient customs for Western ways.

But much of this old picturesque Korea has now disappeared, along with the hermit-like seclusion, and ignorance of the rest of the world, and disease and bad sanitation that ruled before the land was formally annexed to Japan in 1910. Railroads, telegraphs, improved harbors, new agricultural methods, scientific stock-breeding, schools of silk-culture, an improved educational system, and better hospitals—these are marks of the revolutionizing energy with which Japan is now seeking to remake Korea, as she herself was made over in the second half of the 19th century. In every way material progress under Japanese rule has been great. But the Korean nationalistic sentiment, with the cry "Korea for the Koreans," became formidable in the years following the World War, despite the stern hand with which Japan put down conspiracies and revolutionary attempts.

Korea is a rather mountainous country, about as large as Minnesota, less than half of it being under cultivation. Most of it is a penguin-shaped peninsula thrusting south from Manchuria between the Sea of Japan and the Yellow Sea. In the wild bleak north rise richly timbered mountains 4,000 to 8,000 feet high. Here prowl man-eating tigers, while foxes, antelopes, leopards, and bears roam the wooded zigzag mountain range which stretches southward the length of the peninsula. To the west this range throws off a chaos of spurs with steep-sided valleys—a rich region filled with flooded fields of rice and plantations of tobacco, cotton, hemp, peas, soy beans, grains, and ginseng. Here you see the oddly garbed natives, who are of mixed Mongolian and Malayan descent, tilling the soil, often with crude wooden plows drawn by oxen; and you see the big native water hammer, for pounding grain, rising and falling like a thing of life. It is a mere log whose hollowed end is so balanced under a stream that the water alone operates it.

You pass many walled villages, whose one-storied mud huts thatched with white straw look like fields of mushrooms. You are astonished to find that the Koreans long ago anticipated our hot-air furnace; for fire is built at one end of each hut for cooking, and the heat is carried under the house through a system of pipes and flues to the log chimney at the opposite end.

The inland walled city of Seoul, the capital, is a city of strange contrasts—of red-roofed mud huts and splendid modern buildings. Street-cars clang past vendors squatting in front of their shops and porters trudging along under enormous burdens. Such innovations and the many others which are rapidly transforming Korea from a "hermit nation" are due to the Japanese, who have been masters here since their victorious war with Russia (1904–05).

But Korea's national life extends more than 3,000 years into the past. It early developed its own arts and a literature written almost entirely in Chinese.

Printing by means of movable metal types existed in Korea in the 15th century; and one of their admirals in the 16th century invented an iron-clad vessel propelled by oars.

About the same time Korea became tributary to China, following an unsuccessful invasion by Japan which left lasting hatreds in its wake. Tribute continued to be paid to China until 1895, the last year of the Chino-Japanese War. In 1876 Korea was forced to break down her age long seclusion against foreigners. In 1897 the sovereign adopted the title of emperor and Korea became an independent kingdom. The Russian attempt to dominate Korea was the cause of the Russo-Japanese War, which ended by Russia's recognizing Japan's paramount interest in Korea. The Japanese formally annexed Korea in 1910, when Chosen was restored as its official name.

THE TEXTILE INDUSTRY IN KOREA



Here are two Korean women making thread and cloth according to the custom of their country. The spinning is particularly crude, even in comparison with the old hand-spinning of Colonial days, as you may judge by comparing this crude spinning wheel with the ones used by our ancestors. The loom is also of a primitive design, but, considering the handicaps, the Koreans manage to turn out a high quality of cloth.

Coarse cotton and silk cloth, bamboo screens, inlaid ware, and pottery are manufactured, and mats of fabric are woven from hemp and grass. Meat, butter, and cheese are but little known to the natives, but cattle-raising is gradually becoming an important industry. The land yields gold, copper, coal, iron, and other minerals. Many of the gold mines are in the hands of Americans. Missionaries are spreading Christianity with amazing success, and the native converts are said to number more than 1,000,000.

KOSCIUSKO (*kŏs-sĭ-ŭs'kō*), THADDEUS (1746–1817). Like Lafayette, this gallant Polish general and patriot won fame as a champion of freedom on two continents. Of noble family, his talents attracted attention while he was still a military cadet at Warsaw, the Polish capital, and he was sent abroad at the expense of the kingdom to complete his military education by seven years' study in Germany, Italy, and France.

An unhappy love affair led the young captain of artillery, in 1776, to leave Poland and offer his sword to the new republic across the Atlantic. Congress made him a colonel of artillery and he served with distinction as an engineer to the end of the war. The first fortifications at West Point were among the works constructed by Kosciusko. At the close of the war he was rewarded with the thanks of Congress, the rank of brigadier-general, an extensive grant from the public lands, and an annual pension.

Unhappy Poland meanwhile was succumbing to the external aggression and internal anarchy which were to remove her for over a century from the list of independent states. Kosciusko returned in time to fight valiantly but unsuccessfully at Dubienka and elsewhere (1792) against the Russian invasion which preceded the second partition (1793). When a great popular uprising broke out in 1794, Kosciusko became dictator and commander-in-chief. His victory at Raclawice, won in part by peasant forces armed only with scythes and pikes, thrilled the whole Polish nation. His engineering skill successfully defended Warsaw against siege by the combined Russian and Prussian armies. The defeat of his army of 7,000 Poles by 16,000 Russians at Maciejowice (Oct. 10, 1794)—where Kosciusko himself was seriously wounded and left insensible on the battlefield—ended Poland's chance of withstanding her greedy and powerful neighbors. Well might the poet say that "Freedom shrieked when Kosciusko fell."

After his release from Russian imprisonment (1796), Kosciusko revisited America and resided for a time in Philadelphia. Unlike other Polish patriots, he refused to enter the service of Napoleon Bonaparte, for his American experience had made him a democrat of the school of Jefferson. His remaining years were spent chiefly in Switzerland, where he died in 1817. His statue stands in Washington, with those of generals Lafayette, Pulaski, and Steuben, in a public park before the White House. (*See* Poland.)

KOSSUTH (*kŏsh'ŭt*), LOUIS (1802–1894). A brilliant Hungarian lawyer, fiery orator, and Liberal journalist, Kossuth found his chief opportunity when the waves of political revolution spread from France in the years 1848–49 over almost all Europe. He had begun his political career a dozen years before by circulating Liberal publications, first in manuscript, and then in lithographed copies to avoid the government censorship; and for his activity he was condemned in 1837

to four years' imprisonment. From the study of the Bible and Shakespeare during his confinement he gained a wonderful knowledge of the English language. Then, in the Hungarian Diet, his advocacy of freedom of the press and abolition of all feudal privileges had made him the chief leader of the Liberals in the Hungarian part of the Austrian Empire.

With Austria convulsed by the revolution, Kossuth, now become practically dictator in Hungary, advanced to a formal declaration (April 14, 1849) that the Hapsburg house, "perjured in the sight of God and man, had forfeited the Hungarian throne." But his rashness and egotism alienated other Hungarian leaders, while his assertion of Magyar rights led the South Slavs to join with their Austrian masters. The revolution in Hungary, however, was put down only by the aid of a Russian army sent by the Czar (June–August, 1849).

Kossuth was now compelled to flee into Turkey for refuge. Austria and Russia both demanded that he be given up for execution, but England and the United States prevailed on the Turkish government to refuse. In 1851 an American warship carried him to France. In England he was greeted with an enthusiasm similar to that which had welcomed Garibaldi ten years before.

When he visited the United States (1851–52), Kossuth's welcome was equally cordial. He addressed large assemblies in behalf of Hungarian independence; but his eloquence brought no substantial result, in spite of the general sympathy for himself and his cause. He returned to England in 1852, where he remained most of the time for the next 17 years. When his rival Déak brought about the reconciliation of Hungary with the Hapsburg dynasty (1867), Kossuth refused to avail himself of the general amnesty to return to his native land. He remained in Turin, Italy, where he died on March 20, 1894.

KURDS. When we hear the name of the lawless and savage tribes of Asia Minor known as the Kurds, our first thought is of the terrible massacres which they inflicted on their neighbors the Armenians, both before and during the World War of 1914–18. The hostility which resulted in these dreadful atrocities is of comparatively recent origin, for it arises largely from the movement to create an independent state of Armenia and is fomented by the Turks as an additional means of repressing the Armenians.

Like the Armenians, the Kurds belong to the Indo-European stock, but unlike the Armenians, they are Mohammedans. They number between two and three millions and live mostly in an ill-defined mountainous territory known as Kurdistan in northern Persia and what was formerly the eastern part of Turkey. To all their settled and peace-loving neighbors the Kurds are much-dreaded marauders who kill and rob travelers and pillage crops. With their close-fitting yellow fur caps and the arsenal of small arms that hangs from their belts they present a most forbidding appearance. The few Europeans, however, who have dared to visit them in their own mountain villages have found them a people with whom hospitality is as much a part of their religion as war. They live in one-story mud huts, sometimes dug into the ground like cellars. The nomadic members of the community inhabit chocolate-colored felt tents and wander from one mountain pasturage to another with their flocks.

The Kurds are now mostly scattered tribes representing no concentrated power, but at various times in the past, notably in the days of the Crusades, they have been important in a political as well as a military way. They have never been more than nominally subject to the changing rulers and conquerors of the Iranian plateau.

KYOTO, JAPAN. For more than a thousand years Kyoto (or Kioto) was the political, intellectual, and artistic center of the Mikado's empire, and it justly lays claim to the title of "the Rome of Japan." Rich in history and legend, a city of ancient temples, beautiful palaces, and rare treasures of art, Kyoto epitomizes all that is most admirable and interesting in old Japanese civilization.

The natural surroundings are a fitting frame for a city devoted to art. Wooded hills, perennially green, encircle it, and the River Kamogawa, for the greater part of the year little more than a rivulet, meanders through its midst. Tucked away under shelter of the hillsides are picturesque old Buddhist and Shinto monasteries, shrines, and pagodas. On the sunny lower slopes are country estates of wealthy Japanese, surrounded by beautiful gardens, persimmon orchards, and tea plantations.

Kyoto tea is considered the finest grown in the empire. Indeed it is thought to be far too good for export trade, so practically the whole crop is consumed by the Japanese, who think it a great delicacy. In early summer, when the first green tea leaves are being gathered, the suburbs of Kyoto present a very lively scene. The work must all be done by hand, and every available man, woman, and child is called in to help. The shouts of laughter and snatches of song coming from the merry groups among the tea bushes are more suggestive of a family picnic than a hard day's toil. Never is the countryside more picturesque than during the sunshiny days of the tea-picking season.

In the manufacture of pottery, bronze, and ivory wares, of cloisonné, damascene (*see* Japanese Art), and silk, Kyoto surpasses all other cities in Japan. Indeed all art fashions may be said to originate in Kyoto, where the custom still prevails of handing down from father to son the secret processes of expert handicraft. So here are manufactured much of the porcelain, embroidery, brocades, fans, and dyed silks, as well as modern toys, that are so popular in Europe and America.

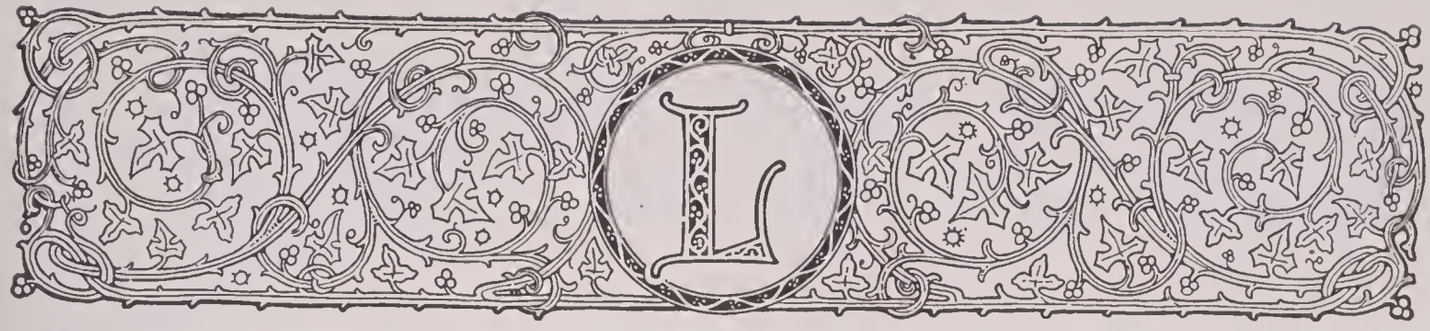
Kyoto is still the goal of devout pilgrims from all parts of the empire. Within its borders are nearly a thousand temples and shrines, many of which appear

in the most unexpected places—in the heart of the business districts, on Theater Street, and in secluded gardens. Having been the dwelling places of many Mikados, all of Kyoto's greater temples are palatial, and the landscapes adjoining them are the most celebrated in Japan. Some are hoary with age; others are comparatively modern, having been built by popular subscriptions gathered throughout the country. In one of the newest temples the heavy beams were lifted into place by cables made from strands of hair contributed by pious women.

When the Emperor Kwammu moved his capital to Kyoto in 793 A.D., he had the city laid out, in imitation of the imperial capital of the T'ang dynasty in China, with wide streets intersecting at right angles. The palace grounds with their beautiful buildings and gardens covered about one-fifteenth of the entire area.

Fires have repeatedly devastated the city, but each time it has been rebuilt as far as possible in the original style. During the Middle Ages, when Kyoto enjoyed its greatest prestige, the population is estimated to have been nearly a million. But as Tokyo (the northern capital) grew, Kyoto declined in size and importance, and finally in 1868 the court was moved to the northern metropolis. Today the population of Kyoto numbers about 540,000 and its industries are not of the sort which can be expected to bring about rapid growth.

One institution in Kyoto is in striking contrast to the many monuments of ancient religious life and thought. This is the Doshisha University, founded in 1875 by the distinguished pioneer of Western learning, Joseph Hardy Neeshima. So, even in Kyoto, new ideas are pressing hard against the old.



LABOR ORGANIZATIONS. One result of the Industrial Revolution and the introduction of the factory system was to reduce the independent hand workers to wage workers completely dependent on their employers for employment and their means of living. Under the new system they soon found that they must accept starvation wages, work 12 and even 14 hours a day, and put up with unhealthful and even dangerous conditions which the competitive capitalistic system introduced (*see* Factories and Factory Laws; Industrial Revolution).

Workingmen soon found that the protest of single laborers against these conditions not only brought no relief, but often led to loss of their employment. Accordingly they began to unite for self-protection in labor organizations and trade unions. While an employer could replace a single workman with little trouble or even get along without him if necessary, it was a very different matter when a whole group quit work. It is on this idea—that in union there is strength—that trade unions and other labor organizations are based.

The first trade unions were formed in England by the tailors and wool-workers, who found that unless they combined and bargained collectively with their employers they were subjected to great tyranny. At first combinations of this sort were contrary to the laws of England, but after persistent efforts the anti-combination laws were gradually repealed by Parliament. It was not until 1871, however, that trade unions received full legal recognition in England.

The Work of the Unions

There have never been any laws which prohibit trade unions in the United States, although at first the English law had great influence in the American courts. In accordance with its early principles, strike leaders were arrested, tried, and punished for "conspiring to raise wages." The earliest trade unions in the United States arose in New York City. They were composed of shipwrights, house carpenters, and printers, the latter forming the famous New York Typographical Society. These labor unions were formed in 1802–07. Since then the trade union movement has developed until now almost every trade of any consequence has its union. Some of the benefits that have been brought about are increased wages, shorter hours, better working and living conditions. In the United States many of the unions also pay "benefits" in the case of sickness, accident, death, or old age of their members.

These early organizations united only men engaged in a certain trade; thus there was a carpenters' union, a bricklayers' union, and so on. In 1834, however, a national federation of trade unions was formed. Although it did not survive the panic of 1837, the example was not forgotten, and in 1869 the Knights of Labor, an organization of all workers regardless of trade, was established. For a time its numbers grew rapidly, but owing to its opposition to trade unions its power declined and its membership rapidly fell.

Its place was taken by the American Federation of Labor, which arose in 1881 through steps taken to federate the trade unions into a central organization. Before this time separate trade unions had frequently declared strikes which for the most part were foredoomed to failure because of the lack of mutual support and outside sympathy. Today the American Federation of Labor is the strongest labor organization in the United States, with a total membership of nearly 3,000,000 working men and women. It has taken an active part in advancing the best interests of the working class. (*See* Gompers, Samuel.)

The "Industrial Workers of the World"

An organization of a very different sort is the Industrial Workers of the World, or the I.W.W., which became notorious during the World War. Its attitude of ceaseless hostility towards employers and its radical policies have also won it disfavor. It is made up very largely of unskilled laborers, and of "occasional" workers like those employed in the hop fields and fruit orchards of the Pacific coast and the lumber camps of the north and northwest. It declares: "The working class and the employing class have nothing in common. Between these two classes a struggle must go on until the workers of the world organize as a class, take possession of the earth and the machinery of production, and abolish the wage system." This organization does not believe in arbitration or conciliation, and considers no contract with employers binding. To gain its demands it advocates "direct action"—strikes and "sabotage," or secret destruction of machinery and goods belonging to the employers. Conservative trade unionists do not approve of those principles and regard the I.W.W. as one of the greatest enemies to the true interest of the laboring class.

Syndicalism (from *syndicat*, the French word for "trade union") is the name given to a similar movement which originated in France and has also made considerable progress in Italy and Spain.

Labrador. Patches and columns of many-colored lights dance fantastically in the midnight sky, above the ice-bound strip of a rugged coast-line rising out of a shadowy phosphorescent sea. "The spirits of the dead are at play," the superstitious Eskimo says, as he looks with awe at the wonderful spectacle of these "northern lights." Presently, when they fade, a fiery dawn breaks forth in splendor, disclosing a wall of giant cliffs washed by the deep blue iceberg-strewn Atlantic—a land where fiords and bays carve their way in and out between titanic lichen-strewn rocks, white with gulls and other sea-fowl.

This is Labrador, the most easterly part of the North American continent, a narrow strip from 10 to 50 miles wide along the mainland of Canada, which politically is a part of Newfoundland. It is a lonely land of brief summers and cold stormy winters, perpetually chilled by the icy blasts that sweep across from the Arctic interior, giving it an average temperature for the year below freezing; and its ports are ice-locked until midsummer by the Labrador current flowing down from the Polar regions. Because of its rigorous climate, there are no farms in Labrador. It is the townless, roadless home of the fisherman and the trapper, of the dog team and reindeer.

The Cree Indian trapper of the south, the squat sturdy Eskimo of the north, and the scattered groups of white settlers are well supplied with firewood, lumber, game, and boots and clothing made of skins. Nearly all do their harvesting in the seas. Almost every man is a fisherman. Even the trapper, who in winter kills fox, marten, lynx, beaver, otter, mink, and other fur-bearing animals, in summertime goes fishing for salmon and cod—especially the latter, which are so abundant that in Labrador the word "cod" is synonymous with "fish." To these coasts, also, threading their way in and out of the countless fine harbors, come each year venturous fishing vessels from the south, manned by thousands of stout-hearted vikings of today who carry away with them several million dollars' worth of fish. Indeed, all Labrador has a "fishy flavor," including its exports (excepting those of lumber, furs, and feathers), which are dry codfish, salmon, seal oil, whale bone, trout, cod oil, and herring.

The English medical missionary, Dr. Wilfred T. Grenfell, for many years did much, by his yachting visits in summer and dog or reindeer sleigh trips in winter, to relieve the suffering and distress among these hardy fisher folk (*see* Grenfell).

The name Labrador was formerly applied to the whole peninsula between the Gulf of St. Lawrence and Hudson Bay, but all this region except the eastern coast is now a part of the province of Quebec. Up to 1912 the northern half, known as Ungava, was a separate territory.

Although the area of Labrador proper (120,000 square miles) is more than twice that of the state of Florida, only about 4,000 people live in its scattered settlements. This is an average of only one person to every 30 square miles! The interior has fine forests of firs and birches, an enormous quantity of pulpwood, and abundant iron. It also possesses at Hamilton Inlet, 250 miles from the sea, magnificent water-power. The source of this is the gorgeous Grand Falls (302 feet high and 200 feet wide) whose roar can be heard 20 miles away. If these falls could be turned to work it is said they would develop energy equal to 1,700,000 horse-power—enough to operate a large proportion of all the manufactories and railways of Canada for many years to come.

AT THE "TIMBER LINE" IN LABRADOR



This desolate snow-swept scene is typical of the bleak wind-swept interior of Labrador, where the forests dwindle away into the Arctic barrens covered only with sedges and lichens. You see just a few straggling trees emerging above the snow, and struggling to maintain themselves against the hostile environment. They are the northernmost outposts of the great forests, which in the south contain valuable stands of timber—firs and birches and pulpwood.

After John Cabot discovered the coast in 1498, fishermen from England, France, Spain, and Portugal flocked to it, attracted perhaps by Sebastian Cabot's assertion that codfish were so numerous that "they sumtymes stayed his shippes." The interior was practically unexplored until 1840.

DAINTY LACES *and How They Are Made*



LACE. At the Paris Exhibition in 1867 was a dress of filmy lace which was valued at $17,000. To make the cobwebby fabric of this dress 40 women toiled day after day for seven long years. And the French Empress Eugenie was presented with a lace flounce as a wedding gift on which 36 women had worked 18 months.

These are examples of the extreme costliness of lace, and the painstaking toil required in its making before the invention and perfection of lace-making machines, which have made possible the mammoth lace industry of today. On these machines many thousands of yards of lace can be woven in less time than a half hundred workers can make a few inches of hand-made lace of the same pattern. Some of these machine-made laces are so exquisite in beauty of design and perfection of finish that it is difficult even for experts to distinguish them and hand-made laces.

The lace-making machine is one of the marvels of the commercial world. Imagine a machine carrying on its reels, which are set one above the other, fine threads set so close together that a silver quarter can just pass edgeways between them. The power is thrown on, and shining little flattened bobbins dance in and out between the close-set threads. Sometimes they dart swiftly over one thread and under the next; sometimes they stop and vibrate rapidly a fraction of a second before they go on. This vibrating movement twists sometimes the warp threads fastened to the reels and sometimes the bobbin threads, and the patterns are made by these twisted threads. Combs quickly press down through the threads to the completed pattern to make it more compact, and more quickly still are up and out of the way. Sixty pieces of lace are often made simultaneously.

The History of Lace-Making

As in the case of so many other labor-saving machines, the development of the lace machine to its present perfection was a slow process. Away back in 1760 a stocking weaver of Nottingham, examining the lace on his wife's cap, believed he could make a similar fabric on his stocking machine, and he did produce an open weave fabric which, however, was a knitted fabric made of one thread passing from one end of the frame to the other, and which unravelled if the thread broke. This was improved by the invention of the bobbin net machine in 1809, so called because the threads were wound on bobbins, but it was not until Jacquard invented his device for fancy weaving in 1847 that flowered nets and laces were produced (*see* Spinning and Weaving). Nearly every design and mesh of hand-made lace has been mechanically produced. The machine lace industry of Europe is centered in Paris, Lyons, Calais, Saint Gaul, Nottingham, and Plauen. Of recent years lace manufacture has grown considerably in the United States.

Hand-made laces are still made all over the world, but their production in quantities for commerce is confined to France, Belgium, Spain, Ireland, Italy, and England. Because of the infinite care and pains and the great amount of time that needs to be taken in its production, hand-made lace will always remain one of the dearest articles of commerce. Some hand-made laces, it is true, are produced more easily and cheaply than the delicate finely wrought designs that take years to produce.

How Hand Lace is Produced

Hand-made lace is of two types—needlepoint and bobbin or pillow lace. Needlepoint is made with a needle and a single thread. The pattern drawn on parchment is stitched to a piece of heavy linen for the purpose of holding it straight. Threads, sometimes three or four in number, are laid on the many lines of the pattern, and are lightly fastened through to the linen. The entire figure is then worked, filling and open work, mesh by mesh, and when it is completed the stitches holding it to the linen are cut and the lace comes free.

In bobbin lace, the design is drawn off on stiff parchment which is carefully stretched over a "pillow," a round or oval board stuffed to form a cushion, and placed on the knees of the worker. The pattern is picked out along the outline of the drawing, and small pins are stuck in at close intervals. Around these pins threads wound on bobbins of varying size are twisted and crossed to form the various meshes and openings. The pattern or "gimp" is formed by interweaving a much thicker thread. Needlepoint lace is the heavier lace, and has the appearance of greater strength, but pillow lace is very supple and is prized for the way it can be draped.

It is hard to say when and how lace had its origin, but it is generally agreed that lace, as we understand it today, was first made when Europe, emerging from the severe and formal Middle Ages, began to bedeck itself in a graceful and beautiful manner, although specimens of woven fabrics of lacelike character have been found in the ancient tombs.

During the first two centuries of lace-making men used more lace on their dress than women. It was used for ruffs, cuffs, collars, scarfs, and cravats, and ruffles of lace at the top of heavy boots were not

TWO BEAUTIFUL SPECIMENS OF OLD LACE



unusual. The most famous laces of this early time were those of Venice, Milan, and Genoa. Venice was celebrated for her points, and Genoa and Milan produced almost exclusively pillow laces. Such lace as was woven in the 16th and 17th centuries cannot be made in a commercial way today. Time is lacking and also the great skill that comes only through years of constant practice. The modern hand-made lace is often more artistic in design, but it cannot be compared with the old pieces preserved in libraries and museums in fineness of execution and thread.

As the industry developed and spread in those early days, the workers became more expert and artistic, and broke away from the stiff geometrical designs which mark the early laces. The various towns of Italy, France, Belgium, Spain, and elsewhere sought to make a product of exclusive pattern that would gain them prestige in the few great centers of commerce of that day. This explains the various names that were given to types of laces hundreds of years ago, and still persist.



The upper strip is an old specimen of the style known as "Point de Burano," while the stole is of Brussels point, sometimes called English point.

Some of the better known hand-made laces are:

Alençon. A fine needlepoint lace named from the town in which it was first made. It has a closeness, firmness, and evenness not found in any other point lace. It was point d'Alençon, decorated with the bee motif, in which the magnificent cradle of the King of Rome was draped.

Antwerp. A pillow lace whose chief characteristic is the representation of a pot or vase of flowers with which it is always decorated.

Blonde Lace. So-called because being made from raw silk, it was "fair," not white, in color. First made at Chantilly.

Bride. Lace whose ground is wholly composed of bars, without a net foundation.

Brussels. Best known variety is an application lace—a lace made by sewing completed patterns on a machine made net.

Chantilly. One of the blonde laces, both in black and white. The ground is very delicate and the pattern is in light or open work design instead of solid. Chantilly is used in making the mantilla.

Cluny. A plaited lace made in silk, linen, or cotton. The patterns are generally of antique or quaint description, mostly birds, animals, or flowers.

Crochet. Lace made with a crochet hook or whose pattern is so made and appliqued on net. Similar to needlepoint, but not equal in fineness to the best examples of the latter.

Filet Lace. A darned net lace which is one of the most widely used of the laces.

Irish. Chiefly a point lace made at Limerick entirely by the needle with very small meshes.

Macramé. A knotted lace made by tying short ends of thread either in horizontal or perpendicular lines and interweaving the knots so as to form a geometrical design.

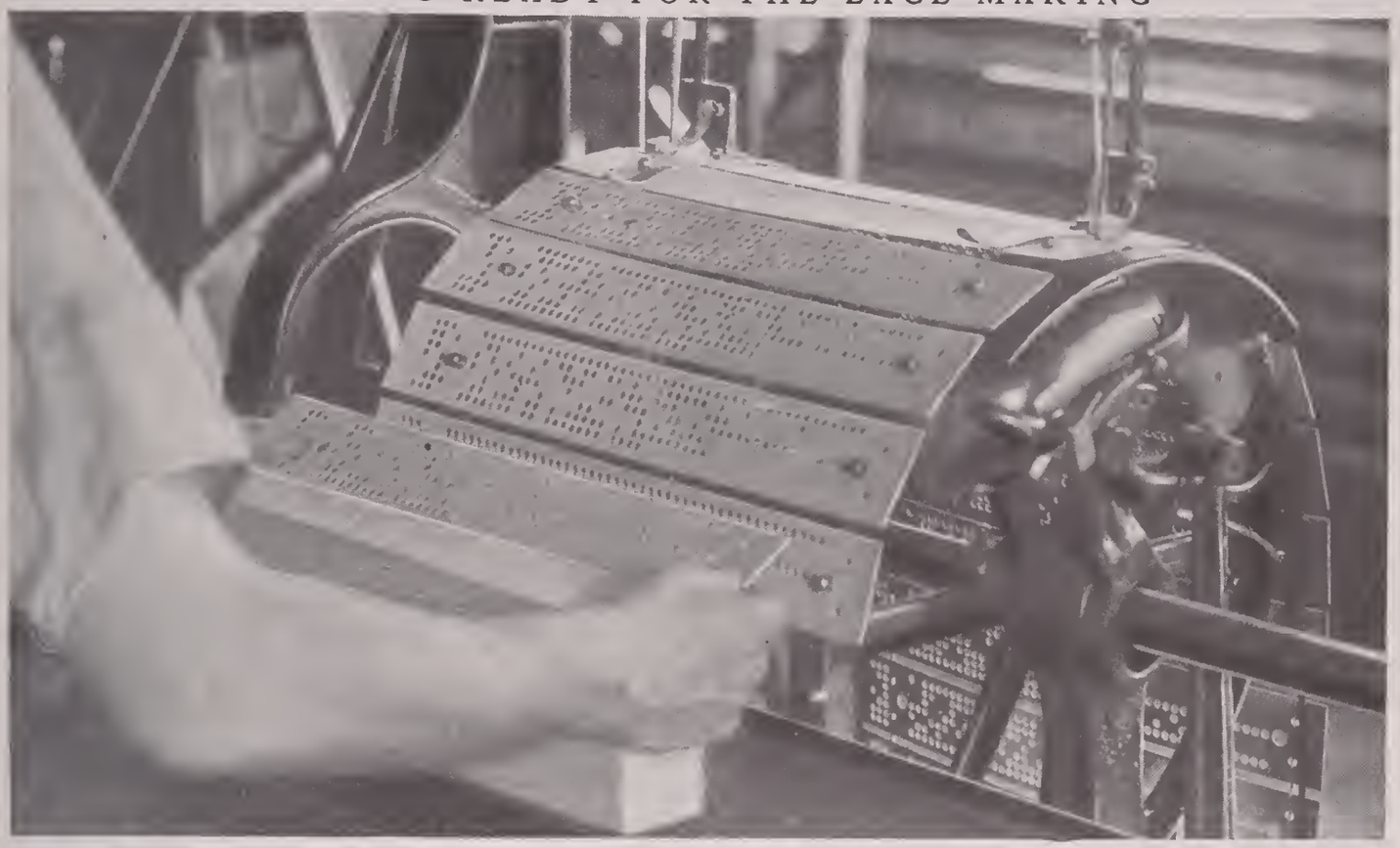
Oriental. Lace made on embroidery machines. In broad sense, oriental laces refer to the product of the East, especially Chinese, Indian, Japanese, Persian, or Turkish laces. They are all remarkable for their great cost and the originality and boldness of the designs.

Honiton Pillow. Made in Honiton, Devonshire, England, celebrated for the beauty of its figures and sprigs. Queen Victoria's wedding dress was of Honiton and cost $5,000. Honiton lace veils are treasured heirlooms.

Valenciennes. A solid and durable pillow lace having the same kind of thread throughout for ground and pattern. It is the most beautiful of all French pillow laces, and in early days was also the most expensive.

For any subject not found in its alphabetical place see information

GETTING READY FOR THE LACE MAKING



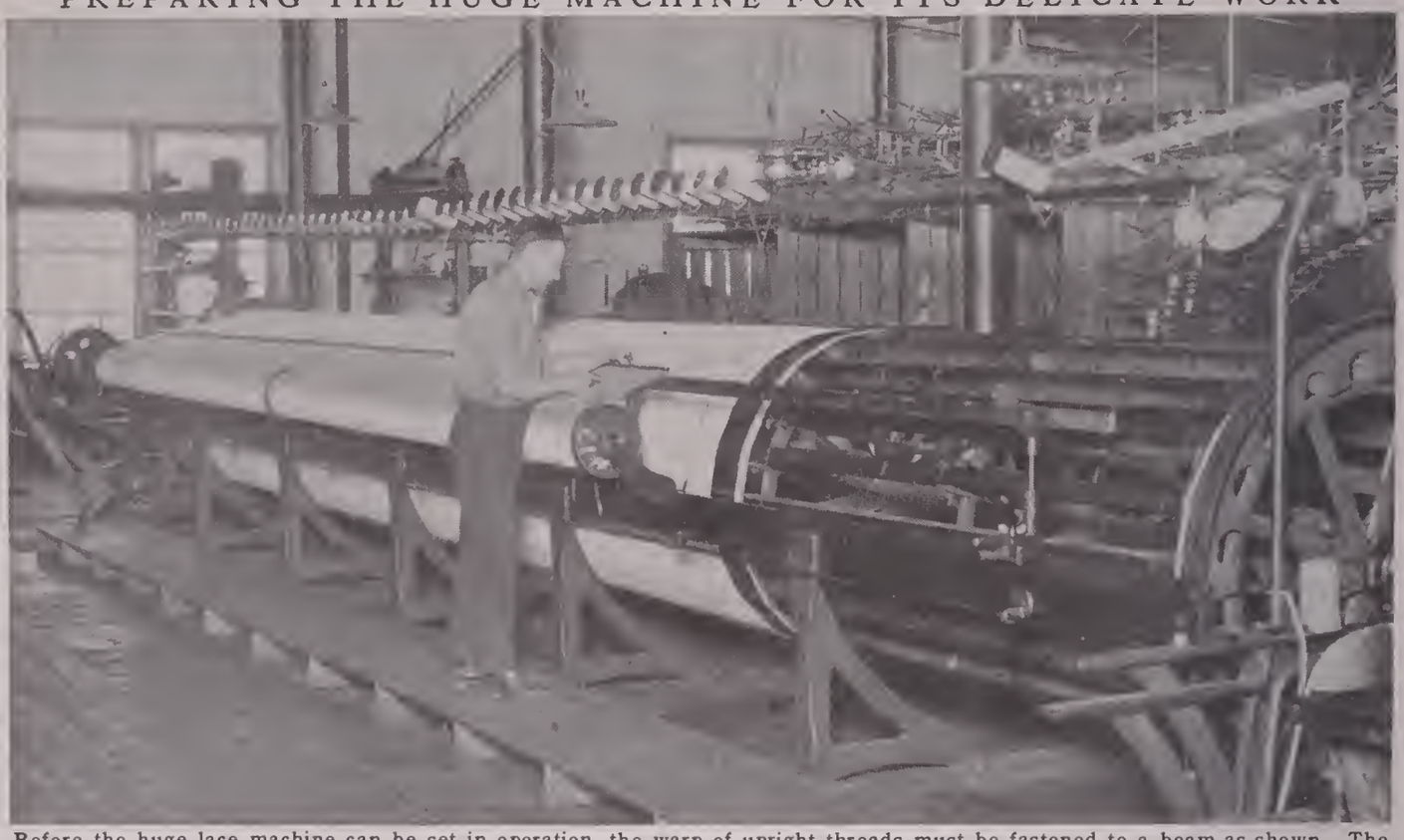
Here a skilled operator is fastening together into an endless chain strips of cardboard which he has punched according to the design furnished him by the lace draftsman. When ready the chain will be run through the lace machine to control its action. Each hole governs a needle in the machine, and the needles, by shifting threads and regulating the tension upon them, produce the pattern.



These men are engaged in one of the most delicate tasks of all—bobbin winding. In the lace machine the upright threads making the warp are fastened to a frame, and these threads are passed through and around them. The cross-thread bobbins must be very thin in order to permit this, and the thread must be wound upon them with perfectly even tension.

contained in the Easy Reference Fact-Index at the end of this work

PREPARING THE HUGE MACHINE FOR ITS DELICATE WORK



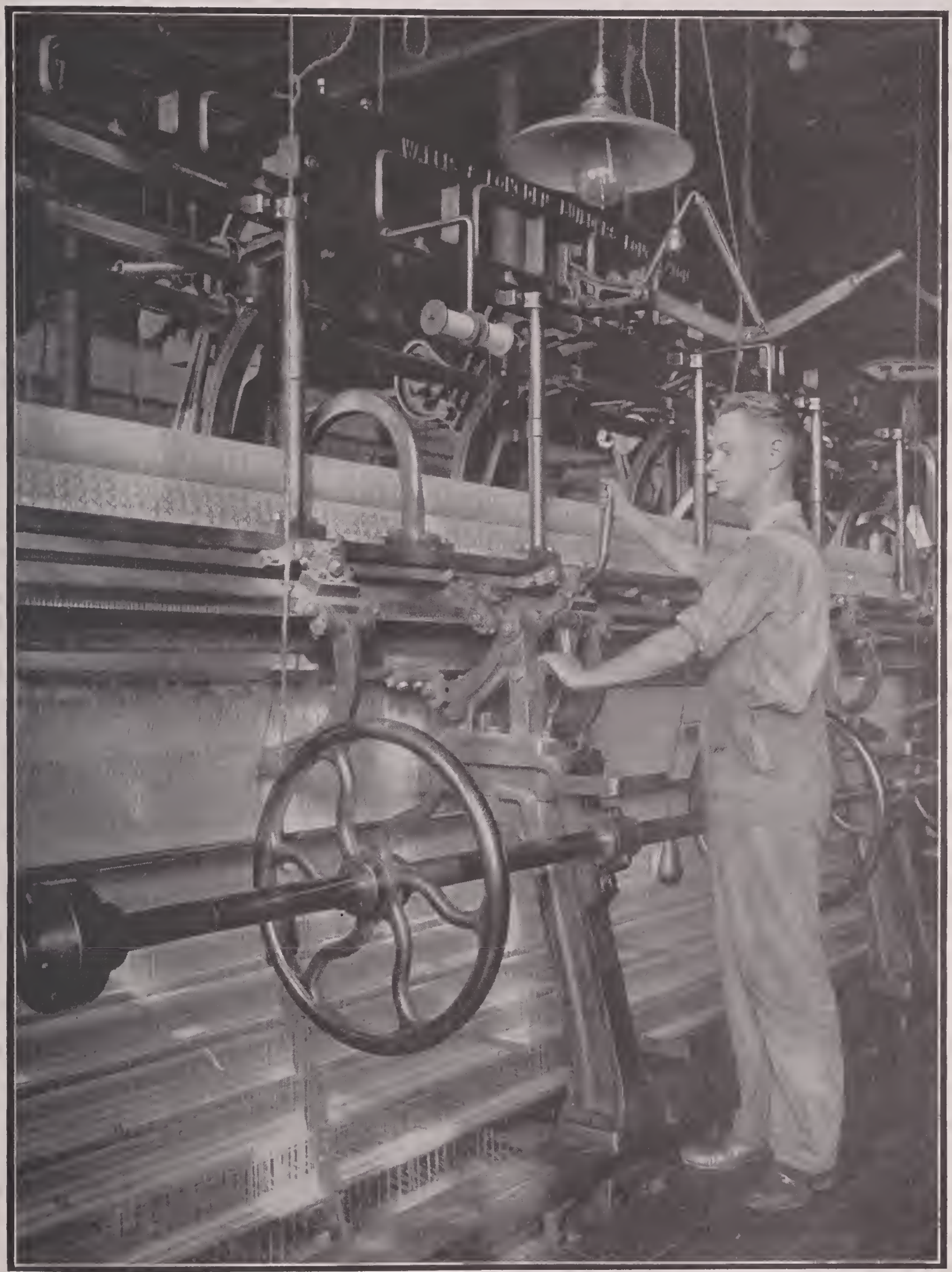
Before the huge lace machine can be set in operation, the warp of upright threads must be fastened to a beam as shown. The cross threads are inserted by hand in the machine, according to the plans furnished by the draftsmen, and each must be carefully fastened in exactly the right spot, in order that it may enter into the pattern properly. Owing to the care with which all this must be done and the great number of threads employed—approximately 8,000 threads must be put in place by hand—the work is exceedingly slow and difficult. The threading process usually requires the time of two highly skilled workmen for two weeks.



The chains of white strips are the cardboard "controls," punched and in place ready to regulate the play of needles within the machine. This control is exercised through steel "droppers" which penetrate the holes as they pass by, and which are connected through a complicated mechanism with the needles. You can judge how complex this control is, from the fact that in machines such as these there are 32,000 droppers at work, transferring the "messages" of the cards to the threads.

For any subject not found in its alphabetical place see information

THE MACHINE STARTS—OUT COMES THE LACE



After all the preparations are complete, the power is turned on and the lace commences to appear on the long roller as you see here. Tiny needles, set like porcupine quills on the roller, catch in the lace and keep it from wrinkling and stretching. Once the machine is going, it will produce sixty yards of lace, with a total width of 224 inches, in sixty hours.

contained in the Easy Reference Fact-Index at the end of this work

LACQUER-WARE. From 3 to 18 coats of "lacquer," obtained from the "varnish tree," are applied to very thin wooden or papier maché shells, covered with silk gauze, in order to make the brilliantly decorated boxes and other objects of Japanese lacquer-ware with which we are all familiar. When the lacquering is done the artist decorates the rich red, shining black, or brown or green background with golden birds, landscapes, water plants, etc. This is an elaborate process, and requires great skill. The finest gold lacquers are left undecorated, depending for their beauty on the multitude of tiny metallic grains shining from the depths of a pellucid ground. The Japanese borrowed the art of lacquering from China in ancient times, but brought it to a height of perfection never attained by the Chinese. Among other improvements, they originated the mother-of-pearl inlays, and the lacquering of gold, silver, copper, and leather. Lacquering is now foremost among Japanese art industries and gives employment to thousands. The tree whose sap furnishes the lacquer is named *Rhus vernicifera;* it grows wild in the woods of China and is also cultivated there. In Japan it is not found growing wild, and its cultivation is an important branch of agriculture. In Europe the process of lacquering came to be called "japanning."

The "lac" used in making varnishes, shellac, sealing wax, etc., must not be confused with the lacquer described above. It is obtained from a scale insect (*Coccus lacca*), which lives upon the twigs of certain species of fig trees and some other trees in the Orient. The insects, in compact colonies of many thousands of females and a few males, attach themselves to the bark and draw up the sap, upon which they feed. They become glued to the twig by the superfluous excretion and after a time die, forming by their bodies little domes over their myriads of eggs. Generation after generation dwells upon the same twig until it is enveloped in a coating often half an inch thick. The preparation of lac from these twigs—called "stick lac"—is an important industry in parts of India and southern China. By tying the stick lac to other trees the insects are induced to spread and thus two crops a year are harvested. The insects secrete a beautiful reddish coloring matter which is strained and evaporated when the lac is melted, and from which the "lake" tints of artists' colors are prepared.

LACROSSE. Of the games now played in America there is probably none that is so truly American as the game of lacrosse. According to Catlin, an American artist and writer who described the Indians early in the 19th century, this was the favorite game of the most active tribes.

As played by the Indians there were sometimes several hundred persons on a side. The goals were placed half a mile or farther apart, the size of the playing area was almost limitless, and games sometimes lasted for many hours. So keen was the competition at times that the contest became more like a battle than a friendly game. "Baggataway" is what the

HOW PLAYERS WORK TO WIN IN LACROSSE



The play is started by the centers, who have the ball between their rackets, or "crosses." At the word "Play!" each center tries to scoop up the ball by drawing the cross sharply inward. The one who succeeds starts toward the opponent's goal, carrying the ball on his cross. Opponents may block him by "body check"—that is, by standing in front of him—but they may not hold or trip. The ball may also be passed from man to man and stopped with the feet, but only the goal-keeper can touch it with his hands.

Ojibways called the sport. Lacrosse is the name given to it by the French and English colonists who learned the game from the Indians and who revised its rules.

The game soon became very popular among the white people and was for many years the accepted national game of Canada. It has also been played during the past 30 years or more by many colleges and schools in the United States, where, however, it has usually ranked as a minor sport. It is a game that demands of the player great agility, speed, and endurance, and skill in handling his "stick."

Lacrosse is played with a solid rubber ball 2½ inches in diameter, which is caught and carried in or thrown from a "stick" three to four feet long, shaped like a fishhook, with the curved part filled with a strong netting of rawhide or heavy catgut. The ball is caught and thrown from this netting, which extends halfway up the handle of the stick. The player usually places one hand on the end of the stick and the other round the middle near the netting. The playing field now is about 120 yards long, with a goal six feet square, like a hockey goal, at each end. There are 12 men on a team, and the general purpose is by running with the ball, throwing it, or passing it from one man to another to carry the ball to the vicinity of the opposing team's goal and throw it inside the six-foot square. It is a foul for any man to touch the ball or another player with his hand—except the goal keeper who may not throw the ball, but may stop it in this way. A man may run with the ball as far as possible, but opposing players may knock the ball out of his stick or run in front of him and "check" him with their bodies. In lacrosse there is no "offside" rule as in other similar games, nor is the ball out of play when it has passed outside the goal and behind the goal line.

LADOGA (*lă'dō-gă*), LAKE. No fewer than 70 rivers pour their icy waters into Lake Ladoga, Europe's largest lake, which lies in northern Russia on the Finland border. It covers an area of 7,000 square miles, about that of Lake Ontario. Navigation is made dangerous by severe storms and by rocks and shoals, so several canals have been dug along its southern shore. Thousands of vessels and rafts pass through these canals yearly, carrying timber, iron, granite, fish, and hay from the northern shores to Petrograd by way of the broad Neva River, through which the lake discharges its surplus waters into the Gulf of Finland. Ladoga is also connected by water with the White Sea. It is icebound for nearly half the year, but is still of great commercial importance to northwestern Russia.

THE PINK LADY'S SLIPPER



The bulblike part of the flower is the "labellum," or distinctive lower petal characteristic of all orchids, and its slipper-like shape is what gives the flower its name.

LADY-BUG. The policemen of the insect world are the "lady-bugs" or "lady-birds," which are really beetles. These small bright-colored creatures are familiar inhabitants of every orchard, field, and garden where they are always busy clearing plants and trees of insect pests. For, friendly as they are to man, lady-bugs are like hungry tigers among other insects. (*See* Scale Insects.)

Perhaps the commonest of this large family in the United States is the red species with two black spots; but among the 150 species are brilliant red ones with black, yellow, or white spots, shining black with red spots, and yellow ones with black or red spots—all arranged in the greatest variety of patterns. Only a very few kinds feed on vegetable food.

When annoyed, lady-bugs defend themselves by ejecting drops of an acrid and ill smelling liquid from their knee joints. Hence they are distasteful to birds and most other insect-eaters, and, in fact, are preyed upon by almost no other creatures. The eggs are laid under the leaves of plants infested with insect pests, and as soon as the larvae hatch they start out greedily "mopping up" their enemies until the plant is clean. When full grown, the larvae hang by their tails from a leaf and so pass through the pupa stage to adult beetles. Scientific name of the common red lady-bug, *Vedalia bipunctata*.

LADY'S SLIPPER. Swinging from the top of tall slender leaf-clasped stalks, these showy flowers of the orchid family flaunt their beauty from May until July in bogs, thickets, and moist hilly woods. Their range is from Nova Scotia to Alabama, and westward to Minnesota and Nebraska. The yellow lady's slipper has a pale yellow pouch, topped by long narrow twisted petals and sepals of greenish-yellow streaked with purple or brown; while converging toward the lip of the pouch are parallel purple lines, that guide the little bees to a spacious banquet hall. The pink lady's slipper, or moccasin flower (*Cypripedium acaule*), is one of the most charming of this genus. Rivaling its exquisite beauty is the lovely "showy" or white lady's slipper (*Cypripedium hirsutum*), which makes its home in the most inaccessible swampy places, in rich mossy woods where the rubber-booted flower lover may find it from the month of June until September.

Scientific name of yellow lady's slipper, *Cypripedium pubescens*. Flower large, solitary with 3 long narrow sepals and 2 narrower petals; inflated sac 1 to 2 inches long, within which are white hairs; triangular stamen and thick stigma. Stalk 1 to 2 feet high. Leaves 3 to 5 inches long, oval, pointed, alternating, and parallel-ribbed.

A HERO OF *Three* REVOLUTIONS

The French Nobleman Who Devoted His Life and Fortune to the Ideal of Liberty—His Services to the Cause of American Independence

LAFAYETTE, MARQUIS DE (1757–1834). Only the name of Washington among the heroes of the American Revolution ranks above that of Lafayette, the gallant young Frenchman who generously placed his life and his fortune at the disposal of the revolted American colonists. By birth he belonged to one of the old noble families of France. His father had been killed in the battle of Minden, in 1759. The young man, whose family name was Du Motier, inherited from his father a castle and the title of Marquis, and from his mother a princely fortune; and at 16 he was married to a charming young wife, who belonged to one of the greatest families in France.



The monument erected in Washington in memory of the great assistance rendered by Lafayette and his companions during the American Revolution.

Three years later, when he was 19 and a captain in the French army, came the news that the American colonies had declared their independence of England, France's ancient foe. "At the first news of this quarrel," Lafayette afterward wrote, "my heart was enrolled in it." So he disobeyed the commands of his king and his angry father-in-law, purchased a ship, and after many difficulties sailed for America. Since he offered to serve without pay, Congress (July 31, 1777) gave him the rank of major-general and placed him under Washington, who soon became a firm friend—almost a father—to the young Frenchman.

Lafayette's services were of inestimable value. He proved a good officer and a wise adviser. He was slightly wounded in his first battle, that of the Brandywine, in September 1777. Next year he was commended for a masterly retreat from Barren Hill and played an honorable part in the battle of Monmouth and in the Rhode Island expedition.

More important, however, was his influence in inducing the French government to sign a treaty of alliance with the colonies, in 1778, without which they could not have won the war. To aid this alliance he was back in France in 1779; but he returned to America in time to assist in the Virginia campaign, and in the final movements which led to Cornwallis' surrender at Yorktown in 1781. He then went back to France, loaded with the favors of his adopted country, and was welcomed with every token of appreciation by his sovereign and fellow countrymen.

Lafayette's love for liberty naturally led him to be one of the liberal French noblemen who favored the Revolution of 1789 in his own country. He was elected to the Estates-General, and in that body presented a draft for a Declaration of Rights modeled on the American Declaration of Independence. On the day after the storming of the Bastille, he was made commander-in-chief of the new National Guard, organized to safeguard the Revolution. It was he who proposed for the Revolutionary armies the famous tricolor — the "red, white and blue"—of modern France.

For the next three years Lafayette played a large part in the history of France. He rescued the queen from the mob of Oct. 5, 1789, and issued orders to stop the king when he sought to flee to the hostile armies outside France. But gradually Lafayette became dismayed at the growing excesses of the Revolution. As the head of an army raised to defend France against Austria, he planned to overthrow the Jacobins and support a limited monarchy. He was therefore proclaimed a traitor, and to escape arrest and the guillotine he fled into Belgium, where he was imprisoned by the Austrians. For five years, 1792–97, he there remained in captivity, until his release was obtained by Napoleon.

Lafayette disapproved of the rule of Napoleon, however, and took no part in public affairs until after

his overthrow. Under the restored Bourbons he played no important part until they attempted to restore the old absolutism. Then he led the opposition, and in 1830 took part in his third revolution as Commander of the Army of National Guards that drove Charles X from France, and placed on the throne Louis Philippe, "the citizen-king."

Twice after the close of the American Revolution Lafayette had visited the United States—in 1784 and 1824. On the latter visit, Congress voted him $200,000 and a township of land. This was a welcome gift, for his own property had been confiscated during the French Revolution. He died at Paris full of honors in 1834. He was not a great general or statesman, but he was a life-long lover of liberty, and played a large part in three great revolutions.

Lagerlöf (*lä'gẽr-lûf*), Ottilia Lovisa Selma (1858–). The big forests, rough rocks, and merry rivers of southwestern Sweden are poor in wealth, but they are rich in dreams. There, among tales and legends which the centuries have woven like mists about the lakes and valleys, a delicate girl caught these dreams and by them changed the commonplace region into fairyland. With an art all her own, Selma Lagerlöf carries us into far fantastic worlds where through strange eyes we catch glimpses which give daily happenings a meaning we quite miss in the busy work-a-day world. She speaks to both head and heart. Her fancy clothes facts in magic raiment, but never hides them.

To make a school textbook, she called to her aid the elf of Northland myth. Together they seated the boy Nils on the back of Morten Goosey-gander and sent him with the wild geese to learn of the geography, plants, animals, industries, and folk-lore of his country; and 'The Wonderful Adventures of Nils' became a children's classic, translated into seven languages before its tenth birthday.

The life of Selma Lagerlöf has almost the romance she gives to her stories. As a little child she was unable to roam about the picturesque country surrounding the old homestead of Marbacka. But by the fireside she listened to oft-repeated weird tales with which the Northland abounds. When not listening she read, or wrote wild strange stories for her own amusement. At 33 she was an unknown schoolteacher. Then her first published book, 'Gösta Berling', brought her swift fame. What the world calls life, she had never known. What it calls doing, she had never done, and yet within 20 years she was known and loved throughout the western world, not alone as the winner of honors rarely bestowed upon women—among others the $40,000 Nobel prize for literature—nor as one of the foremost women writers of the age, but as a teller of rare fairy tales that are read by young and old alike.

In the United States, her fame came through the publication of her 'Christ Legends' and 'The Wonderful Adventures of Nils', translated by Mrs. Velma Swanson Howard. But her other books have now become almost equally popular and have all been translated and published in English.

Her works include: 'Gösta Berling' (1891); 'Invisible Links' (1894); 'Miracles of the Anti-Christ' (1897); 'From a Swedish Homestead' (1899); 'The Wonderful Adventures of Nils' (1907); 'The Girl from the Marsh Croft' (1908); 'Further Adventures of Nils' (1911); 'Liljecrona's Home' (1911); 'The Legend of the Sacred Image' (1913); 'Matilda Wrede' (1913).

Lakes. Technically a lake is an inland body of water, larger than a pool or pond, that is surrounded by land. Actually, however, the name is given also to the widened parts of rivers, and to bodies of water which are in direct connection with the sea; while other inland bodies, like the Caspian and Dead seas, are true lakes although not so called. Like Great Salt Lake, these seas are salty because they have no outlet to the ocean, but lose their water by evaporation, which leaves an excessive amount of mineral matter behind. The Caspian Sea is the largest inland body of water in the world, while Lake Superior is the greatest of fresh water lakes.

Lakes are found in any depression of the land surface where there is a sufficient supply of moisture. These depressions may be due to various causes: (1) Hundreds of thousands of lakes owe their origin to the great glaciers which in ancient times filled many river valleys with their deposits, or created new hollows by gouging out rock or distributing their debris unequally. It is owing to glacial action that North America has larger and more numerous lakes than any other continent. (2) Many lakes are formed by obstructions in river channels caused by lava flows, land slides, the operations of the beaver, or tributaries that bring down sediment which blocks the main stream and forms a lake. The abandoned "meanders" or windings of a river often become the sites of lakes, and are called "oxbow" lakes or bayous. (3) Occasionally the warping of the earth's crust creates depressions, as in the case of Lake Geneva, which was formed by the subsidence of part of the Alps. (4) Sometimes "sink lakes" are formed by the sinking of land due to the washing away of underlying soluble rocks. (5) Lakes are often found also in the craters of inactive volcanoes; thus the deepest fresh-water lake in North America is Crater Lake in Oregon, where the volcano formation is perfectly evident.

Many European lakes, especially in Switzerland and northern Italy, show signs of having been inhabited by prehistoric "lake dwellers," whose houses were built on wooden piles driven into the lake bottom along the shore. Study of the bones, implements, and other remains found in the mud and sands underlying such sites gives us much interesting information of the life of these early peoples who lived 10,000 or more years ago. (*See also* Physiography, and separate articles under the names of different lakes.)

Lamb, Charles (1775–1834). As long as the English language is spoken or read, Charles Lamb will be remembered as one of the most lovable figures in English literature. He was not only the most delight-

ful of essayists, but the cheeriest of companions and the best of friends to a number of other brilliant literary men, and he was one of the bravest spirits that ever lived.

He was born in the heart of London in the Inner Temple, a great rambling old building filled with lawyers' offices and lodgings. His father, whom he described as "a man of incorrigible and losing honesty," was a poor lawyer's clerk. At the age of seven Charles was sent to Christ's Hospital, the famous "Blue-coat" school. Here he met another poor boy who became his lifelong friend—the poet Coleridge. These days are delightfully described in his essay, 'Christ's Hospital Five-and-Thirty Years Ago'. At the age of 17, Lamb became a clerk in the accountant's office in the East India House, where he remained until he retired on a pension 33 years later.

When he was 21 the quiet of his life was broken by a terrible calamity. His sister Mary fell a victim to the insanity that was hereditary in their family, and killed her mother. She was confined in an asylum, where she recovered temporarily, and upon her brother's giving a solemn promise to care for her the rest of her life, she was released. Thenceforth Charles Lamb sacrificed everything for his sister. When her malady recurred, he would take her by the hand and brother and sister would walk mournfully to the asylum. But in the intervals which he called "between the acts," there was much that was cheerful and beautiful in their life. They became famous for their evenings "at home," when the brightest wits of London gathered for talk and laughter and good cheer. Mary Lamb shared in many of her brother's literary labors. They wrote together the 'Tales from Shakespeare' which have given pleasure to so many children.

The "Essays of Elia"

Although he began his literary career by writing poetry and first won distinction by his literary criticism, Charles Lamb's fame today rests chiefly on the essays written under the name of "Elia." In these essays he has taken the most trivial subjects, chosen apparently at random, and put into them his own whimsical, pathetic, quaintly humorous personality. Whether he writes 'A Chapter on Ears', 'Imperfect Sympathies', 'The Praise of Chimney-Sweepers', 'Old China', or a 'Complaint on the Decay of Beggars', he says something worth while and says it in his own inimitable way. Probably no essay in the English language has aroused more laughter than his 'Dissertation on Roast Pig', and none is more full of pathos than his beautiful 'Dream Children'. Lamb's style has an old-fashioned flavor—described by himself as a "self-pleasing quaintness"—due to his partiality for the older writers.

In addition to the 'Essays of Elia', Lamb's most important prose works include the critical notes in his 'Specimens of English Dramatic Poets who Lived about the time of Shakespeare', 'The Adventures of Ulysses', and his romance 'Rosamund Gray'. His best known poem is 'The Old Familiar Faces'.

Lamprey. There are gruesome stories that in the days of the Roman Empire wealthy masters sometimes punished their slaves by chopping them up and feeding them to lampreys in their fish ponds. Whatever the truth of these stories, we know that lampreys were considered one of the greatest delicacies in Roman days, and that the millionaires of the time kept them alive in special ponds where they were carefully fattened for the banquet table.

As far as the lamprey himself is concerned, the slave story does him no injustice. These eel-like fish, which inhabit today almost all oceans, seas, and rivers, fasten themselves with their cup-shaped mouths to other fish and suck their blood. Salmon and shad are sometimes caught with lampreys attached to them, and much damage is done among valuable food fishes in this way. In return, the lampreys are taken in large numbers to be used as bait for cod and turbot.

The sea lampreys reach a length of three feet. They are still eaten to a great extent in Europe, and in lesser quantities in the United States; but their flesh is not easily digestible. King Henry I of England is said to have died from indigestion caused by lampreys, which were his favorite dish. The river lampreys found in the upper Mississippi valley and the Great Lakes are rarely much more than 12 inches long. When not attached to other fish, lampreys fasten themselves to stones or sunken logs to rest. Their skeleton is of gristle and for this reason they are classed among the lower fish families. Scientific name of sea lamprey, *Petromyzon marinus;* river lamprey, *Petromyzon fluviatilis.*

Lamps and Lighting. Man's earliest lighting apparatus was simply a burning brand plucked from the camp fire. His earliest lamp was merely a hollowed stone, sea shell, or animal's skull, with animal fat or fish oil as fuel, and reeds, rushes, or a twist of moss or vegetable fiber as the wick—such a lamp as the Eskimos still use. The dim smoky lamp of Greece and Rome—the traditional "lamp of learning"—was essentially a shallow round or oval dish, with a handle at one end and a sort of spout for the wick at the other end. These lamps were of baked earth or metal—chiefly bronze—and cloth or a roll of tow formed the wick. In very early times, too, candles were invented; that is, cylinders of wax or solid fatty matter inclosing a wick.

It was not until 1783 that M. Legers of Paris introduced the flat lamp wick, which lessened the smoke, and the spur-wheel for adjusting the wick and regulating the flame. In 1784 Aimé Argand, a Swiss chemist, invented a burner consisting of a flat wick in a circular tube, so arranged that the air could pass through the tube and reach the center of the flame. A workman in the Argand laboratory one day discovered, quite by accident, that a broken glass bottle placed over the burner suddenly made the flame brilliant and steady, and thus the glass chimney came into use.

The safety lamp for the use of miners, devised in 1815 by George Stephenson and Sir Humphry Davy,

was another very simple device, but one which has saved countless lives. This lamp, which with slight modification is still in use, is merely a common lamp with a wire gauze cylinder about the flame to prevent the heat from igniting explosive gases.

Animal fats, whale, fish, and vegetable oils were used in lamps until about 1845. Whale oil, indeed, was much used in lighthouses until recent times (*see* Lighthouses and Lightships). With the introduction of petroleum, about the time of the American Civil War, kerosene or "coal oil" became practically the only illuminant; and with its use came many more improvements in lamps and wicks, particularly in America.

While the early New England colonists had been using the flat, iron, pear-shaped "Betty lamp" —the kind brought over in the Mayflower—Benjamin Franklin had contrived a superior lamp of two round wick tubes, and also suggested the improved, loosely braided cotton wick. In 1865 the double burner was introduced, having two parallel flat wicks and two flames, which soon became very popular. Later came the development of the "student's lamp," with a special tank reservoir above the wick level. This marked the highest point in the development of the oil lamp.

A greater step in advance came with the introduction of the gas light, which began to be used in the United States about 1817, and which was the best light until the electric light was invented. The electric light surpasses all others, for it is the only light that does not use up the oxygen and give off disagreeable odors. It is better and safer than gas or kerosene, and it is cheaper even than candle light.

LAMPS—ANCIENT AND MODERN



At the top is a burning ember on a forked stick. Then comes a burning rag floated on oil; then the Greek lamp, tallow candle, oil wick lamp, gas jet, and the electric light.

For general room lighting we may now use the indirect lighting systems, in which large porcelain shades are hung below the ceiling lamps so that the rays of light are directed up to the ceiling. A soft light is thus reflected from the ceiling and distributed evenly over the room. Even better results are obtained by the semi-indirect lighting systems, in which the shades hung below the lamps are of opaque glass so that the softened light coming through the shade is added to the light reflected from the ceiling. A room lighted by such a system is free from glaring lights and shadows. The light corresponds more closely to daylight and is better adapted than direct lighting to reading and working by artificial light. (*See also* Acetylene; Electric Lighting; Gas, Illuminating.)

Lancaster. The claim of Henry, Duke of Lancaster, to the English throne was accepted by Parliament in 1399, after Richard II was deposed for mis-government; and as Henry IV (1399–1413) he became the first of the Lancastrian dynasty. His hero son Henry V (1413–22), and the latter's weak and incompetent son Henry VI (1422–61), are the only other members of the family who wore the crown. The rival claims of the house of York led to the bloody Wars of the Roses in which the last of the direct line perished (*see* Roses, Wars of the). Because the Lancastrian kings owed their throne to Parliament, the power of that body grew greatly in their time.

The English county of Lancaster, from which comes the name of the family, lies in northwestern England, fronting on the Irish Sea. It is now the chief seat of the cotton manufactures of England, and one of its busiest and most populous counties. The county seat, Lancaster, is a town of about 45,000 inhabitants, and has a castle built by John of Gaunt, the father of Henry IV.

Lands, Public. The greatest landowner in America is still Uncle Sam himself. Even now he owns as public lands about 500,000,000 acres, or about one-fifth of the whole land surface of the United States, including Alaska. This does not include his forts, arsenals, forest reserves, national parks, and the like, but only the lands he is willing to dispose of to anyone who may wish to acquire a home. This is only a small part of the land he formerly owned, which would make a country about half the size of the United States without Alaska.

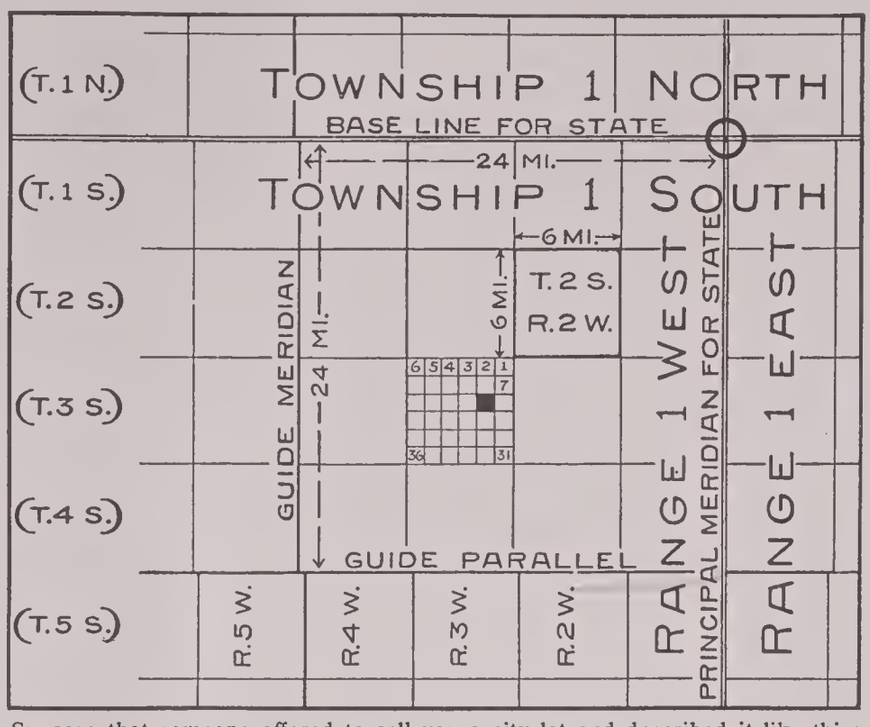
This vast public domain of the United States was acquired at different times and in different ways. The beginning of it was made following the Revolutionary War, when the states gave up to the national government their claims to lands beyond the Allegheny Mountains. It was added to by the Louisiana Purchase in 1803, and still further increased by the acquisitions of Florida, of the territory taken from Mexico at the close of the Mexican War, of Oregon, Alaska, and the numerous island possessions.

Uncle Sam seems literally to have had so much land he didn't know what to do with it. In early days he gave it away to individuals (like Lafayette) who had rendered great public services, or to veterans of his early wars, or sold it for almost nothing to speculative land companies. Later great tracts were granted to encourage railway building. In time, however, Uncle Sam realized that soon he would have no land left and that many of his people would not have farms of their own, and so he made laws reserving his land for actual settlers.

The first Homestead Act, passed by Congress in 1862, provides that an American citizen over 21 years of age, or who is the head of a family, may obtain 160 acres of public land on condition that he live on it three years, cultivate a certain portion of it, and make certain improvements. Various changes in the law have since been made. In certain parts of western Nebraska and other states where the land cannot be irrigated and is not listed as mineral-bearing or timberland, as much as 640 acres may be obtained. A soldier who has seen war service may count his time of service as part of the time required for residence, and for others the time may be shortened to 14 months, upon payment of $1.25 an acre.

Another use of the public lands has been and will continue to be of inestimable value to all the people of the United States. This is the grant to the states of large amounts of land for the support of public schools. Other grants have been made for the establishment of colleges of agriculture and state universities. Until 1850 every new state admitted to the Union received one-thirty-sixth of its area for the support of public schools, and since 1850, one-eighteenth. An additional grant of four townships of land is made for a state university, and also a grant for an agricultural college.

HOW A PIECE OF LAND GETS ITS OFFICIAL NAME



Suppose that someone offered to sell you a city lot and described it like this: "Lot 38, N.W. ¼, Sec. 14, T. 3 S., R. 3 W., Ind."—would you know how to find it? This diagram will show you the secret. In the first place you must read the name of that lot backward. To begin with, then, "Ind." means that it's in Indiana. Now all states have "Base Lines" and "Principal Meridians" crossing each other, from which all land locations are determined. The next part of the name "R. 3 W.," therefore, means that your land is situated in "Range 3 West" of the Principal Meridian; and the "T. 3 S." means that it is also in "Township 3 South" of the Base Line. Where the third range strip crosses the third township strip is the "Township" which contains your lot. Now each Township is divided into 36 "Sections," each a mile square. "Sec. 14" means that your lot is in the 14th Section, the one shown in black. Each section is divided in four "Quarters," and yours is the Northwest Quarter (N.W.¼). All the lots in that Quarter are numbered, so it's easy to find it now. Every 24 miles "Guide Parallels" and "Guide Meridians" are surveyed, and those jogs you see in the meridians where they cross the Guide Parallel are to allow for the curvature of the earth.

The administration of the public lands is in the hands of the General Land Office of the Department of the Interior, in Washington. Under the system of surveying which has long been in use, the lands are laid out into "townships" six miles square; and each of these townships is subdivided into 36 "sections," each containing one square mile, or 640 acres. The sections in turn are subdivided into quarter sections of 160 acres. Certain parallels of latitude are taken as *base lines*, and certain meridians of longitude as principal meridians. Townships are described as Nos. 1, 2, 3, etc., north or south of the base line, and in *range* one, two, three, etc., east or west of the principal meridian. A reference to the accompanying diagram will make clear this system of land description, which is used in legal documents to describe land in all states formed out of the public domain.

The legal title of Canadian public lands is vested in the crown, and when the property is spoken of as belonging to the Dominion or a province, it means only that the right to its use or its proceeds has been appropriated to the Dominion or the province, and is under the control of its legislature. The public lands in Manitoba, Saskatchewan, Alberta, and the railway belt (40 miles wide) in British Columbia are administered by the Dominion. Deeds for free homesteads are issued on proof that the settler is a British subject, has resided on his homestead for at least six months in each of three years, has built a house thereon and broken 30 acres of his land. In Ontario, Quebec, Nova Scotia, and New Brunswick the provincial government administers the public land. There are no public lands in Prince Edward Island and none free in Nova Scotia.

LANDSEER, SIR EDWIN (1802–1873). "Where is my curly-headed dog boy?" the teacher of the Royal Academy school used to ask, when he missed the lad

Landseer from his classes. The answer would be "At the Zoo," for this boy divided his time between the two places, and at either was sure to be found studying animals or making pictures of them. Dogs were his favorites, and his first drawing to be engraved and published was of a great St. Bernard. "Fighting Dogs Getting Wind," was the first of his paintings to bring him fame. His London studio was full of paintings of dogs, big and little, fierce and kind,—all so real that visitors would stop at the door and call out, "Landseer, keep your dogs off."

Although he was especially fond of dogs, Landseer loved all animals. Once in Scotland he was taken deer-hunting, and as he and his host lay in ambush a splendid stag appeared. While the host in courtesy waited for Landseer to make the shot, the artist dropped his gun and pulling a pencil and pad from his pocket began making a sketch of the magnificent animal.

LANDSEER AND HIS DOGS



The group, with two of his dogs looking on at his work, expresses Sir Edwin Landseer's character perfectly. His love for animals was equalled only by his ability to paint them.

Landseer could draw rapidly and easily. A story is told of how he once drew a stag's head with his right hand, at the same time drawing a horse's head with his left. From boyhood, when at the age of 11 years his drawings won a silver palette from the Society of Arts in London, Landseer's life story is of one success after another. He was early made a member of the Royal Academy; he enjoyed the patronage and friendship of Queen Victoria; he was knighted, and the presidency of the Royal Academy was offered to him. Upon his death in 1873 he was buried in St. Paul's Cathedral.

Of his many dog pictures, 'The Old Shepherd's Chief Mourner' is perhaps the best known. His stags are quite as popular as his dogs, and of these the 'Monarch of the Glen' is a favorite. Besides his pictures of animals Landseer painted many portraits also. His celebrated sculptures of lions in Trafalgar Square, London, show equal mastery in this field.

LANIER', SIDNEY (1842–1881). The South has given at least two great poets to the world—Edgar Allan Poe and Sidney Lanier. Poverty and neglect was the lot of both. But in spite of many troubles, Lanier was always serene and brave. His life was hard; he never really had a chance to express his best. In 1873 he wrote to his father: "My dear father, think how, for twenty years, through poverty, through pain, through weariness, through sickness, through the uncongenial atmosphere of a farcical college and of a bare army and then of an exacting business life . . . these two figures of music and of poetry have steadily kept in my heart so that I could not banish them."

Sidney Lanier's life bears out these words. He was graduated from a small Southern college in 1860 at 18, and entered the Confederate army soon after. The years were not spent wholly in fighting; reading, playing the flute, and writing poetry filled in the time. Unfortunately he was taken prisoner on a blockade runner toward the close of the war. His lungs, which had never been strong, were badly infected during his five months in prison. He never fully recovered his health, and the rest of his life was a series of struggles against tuberculosis. The Baltimore climate seemed to agree with him best. There he became a flutist in the Peabody Symphony Orchestra and a lecturer in English at Johns Hopkins University. These situations helped him to establish several delightful friendships. He brought his wife—formerly Miss Mary Day of Macon, Georgia, whom he married in 1867—and family north in 1876. In the same year he wrote his Cantata for the Centennial Exposition.

Music and poetry, as he says, dominated his life and are closely associated. His poetry is melodious because he had a full knowledge of the music of English sounds. His rhythms show great beauty. 'The Song of the Chattahoochee' has often been com-

pared with Tennyson's 'The Brook' and does not suffer by the comparison. He shows his mastery of poetic forms in:

All down the hills of Habersham,
All through the valleys of Hall,
The rushes cried, *Abide, Abide,*
The willful waterweeds held me thrall,
The laving laurel turned my tide,
The ferns and fondling grass said *Stay,*
The dewberry dipped for to work delay,
And the little reeds sighed, *Abide, Abide,*
Here in the hills of Habersham,
Here in the valleys of Hall.

Lanier loved beauty in all forms, but he seemed to have an especial feeling for trees and for marshes. To him a forest was healing, as shown in his work, 'A Ballad of Trees and the Master':

Into the woods my Master went,
Clean forspent, forspent.
Into the woods my Master came,
Forspent with love and shame.
But the olives they were not blind to Him,
The little gray leaves were kind to Him,
The thorn-tree had a mind to Him
When into the woods He came.

As a prose writer he contributed volumes of literary criticism, travel, and children's books.

In an older civilization, Lanier's power might perhaps have found earlier recognition and ampler support. In America after the Civil War he had to struggle along as best he could, making a bare living and stealing time for his verse. The wonder is that he accomplished so much with the obstacles of illness and the pinch of poverty to overcome.

His best known works are: 'Tiger Lilies: A Novel' (1867); 'Poems' (1876, 1884, 1891); 'Florida: Its Scenery, Climate, and History' (1876); 'The Boy's Froissart' (1878); 'The Science of English Verse' (1880).

Lapland. If you should visit the frozen lands in the extreme north of Norway, Sweden, Finland, and Russia, on a Sunday you would see black dots come sailing along down the steep slopes of the hills. On closer view they turn out to be squatty bowlegged people, just about five feet high, traveling to church on skis or driving there—sometimes 100 miles—in "pulkas," their queer little reindeer sledges that look like birchbark canoes. These are Lapps, the shortest people in Europe, who live—about 30,000 of them—in a dreary arctic region with a long sunless winter. The region over which they roam is called Lapland, but it has no independent political existence.

The Lapps are of Asiatic origin and speak a language something like that of the Finns. They are an honest healthy contented little people, who wash their flat Mongolian faces only on festive occasions and who live with their dogs in tents or earth-covered huts. Most of them spend their lives in fishing, hunting, and tending their many reindeer that feed on mosses and lichens. A rich Lapp may own perhaps 2,000 reindeer, for these are the people's chief resource, supplying them with meat, milk, and clothing, and furnishing the only means of transportation. There are nearly half a million reindeer in Lapland altogether. The true Lapps lead a semi-nomadic life because of the need of fresh pastures for their herds; pasturage once closely cropped is not used again for some ten years. The fishing Lapps, however, live a more settled life.

Larch. This tree is peculiar among conifers in that its needle-like leaves are shed each year. There are about eight species of the larch, widely distributed through the northern hemisphere, three of these

THE LARCH TAMARACK OF NORTH AMERICA



At the left is the tree, in the middle its scaly trunk, and at the right its needles and cones.

occurring in North America. The lone species of the northeastern United States is called the American tamarack or hackmatack. It is a slender tree from 30 to 90 feet in height, thriving in swampy woods and about the margin of ponds and lakes. It is ornamental and graceful, its slenderness of form being accentuated by the dainty threadlike character of its deep green foliage. Longfellow mentions this larch in "The Song of Hiawatha":

"Give me of your roots, O Tamarack!
Of your fibrous roots, O Larch Tree!
My canoe to bind together
That the water may not enter,
That the river may not wet me."
And the Larch with all its fibers,
Shivered in the air of morning,
Touched his forehead with its tassels,
Said, with one long sigh of sorrow:
"Take them all, O Hiawatha!"

The wood of the tamarack is light brown in color and is resinous and durable, being useful for railroad ties and shipbuilding.

Scientific name of the American larch, *Larix laricina.* Bark close, becoming scaly. Leaves simple, threadlike, small, falling in autumn. Cones small, broadly ovate. Seeds few, rounded, thin, entire.

LARK. The bird that "at heaven's gate sings" is an unpretentious little brown fellow, but he and the rest of his family, in spite of their plain appearance, are renowned in both poem and prose as songsters.

LARK EGGS



These four eggs of the Prairie Horned Lark are nested cosily in spite of the unseasonable snow which surrounds them.

Larks are almost exclusively birds of the Old World. There are about 100 species, usually streaked brown above and white and brown beneath; many are crested. They nest on the ground and feed on grain and insects. They are found in northern Europe, Asia, Africa, and India. The only species found in America, the horned lark, is about the size of the bluebird, with pointed tufts of feathers just above and behind the eyes. (For illustration in colors, *see* Birds.) Like its more famous cousin, the skylark of Europe, it sings its wild, joyous song on the wing. The meadowlark is not a true lark (*see* Meadowlark).

The skylark is the poet's bird. "On wings of song" he soars until he fades from view, and only his melody, wafted downward, tells of his onward flight. Then, still fluttering and singing, he comes again into sight, swinging in wide aërial circuits until, his song ended, he sinks to the earth nest where among the grasses his little mate is waiting for his return.

These birds multiply rapidly. Each pair will rear several broods of from three to five birds in a season. As autumn approaches they congregate in great flocks of countless hundreds in eastern England and Scotland, and enormous numbers are netted for the market. But though the skylark is much esteemed as a table delicacy, it is its song that has brought it fame.

But the lark is so brimful of gladness and love,
The green fields below him, the blue sky above,
That he sings, and he sings, and forever sings he.
—*Coleridge.*

Scientific name of the skylark, *Alauda arvensis;* horned lark, *Otocoris alpestris.*

LARKSPUR. These charming clustered blue-and-purple blossoms, brought from Europe to adorn the gardens of America, have strayed into woods and fields, adding their beauty to the bright summer pageant of wild flowers. From June until August the "tall larkspur," growing to a height of five feet, waves its plumy wands of purplish-blue in the woods from western Pennsylvania westward to Nebraska, and through the Carolinas to Alabama. The blossoms with their long uptilted spurs look like lovely little creatures poised for flight. They rest lightly on the ends of tiny stems that crowd close together on a central stalk.

A CLUSTER OF BLUE



The buds at the bottom show plainly the spur which gives the plant its name of "Larkspur."

In the same region, and northward to Minnesota, the dwarf larkspur (also called the staggerweed because of its effect on cattle) blooms from April until June. Its flowers are blue or occasionally white, and grow in loose clusters at the end of a stout stem rising from the root. The Carolina larkspur is shorter and more slender of stem, with blossoms of blue, pink, or white. This species grows also on the prairies of the north and west and in the Rocky Mountain region.

The larkspur has both annual and perennial species. Among the former are the branching larkspur and the lovely rocket larkspur of Switzerland. The perennials, however, are the most gorgeous of the family, which is akin to the crowfoot.

Scientific name of the tall wild larkspur, *Delphinium exaltatum.* Flowers 1 to 1½ inches long growing in a long raceme; 5 petal-like sepals with rear one prolonged into a slender curved spur; 2 united petals with spurs that project into spur of sepals; 1 pistil; numerous stamens. Stem erect, simple or branched, 18 inches to 5 feet tall. Leaves alternate, petioled, palmately divided.

Larva. A term applied to the young of many animals when, on hatching from the egg, they are markedly different from the adult. It is especially applied to insects, most of which hatch as larvae; but frogs and toads also have a larval stage, in the fishlike "tadpoles" which hatch from the eggs. The larvae of beetles are "grubs"; of flies, "maggots"; of butterflies and moths, "caterpillars." Some larvae, as is the case with grasshoppers, are almost like the full-grown insect, wanting only wings; others appear very unlike the adult, as in the case of the caterpillar of a moth or butterfly. The latter must go through another stage, called *pupa*, before they become fully developed insects. Larvae live only to eat and grow, often working untold harm to vegetation. As the larva grows, it sheds its skin or molts. The young grasshopper, for instance, molts four or five times; other larvae as often as 20 times before they are full grown. (*See* Butterflies and Moths; Caterpillars; Insects.)

La Salle, Rene Robert Cavelier, Sieur de (1643 – 1687). Shouts of "Long live the King" echoed and reëchoed through the wilderness at the mouth of the Mississippi on that April day, in 1682, when the Sieur de la Salle and his little band took possession of the country of "Louisiana" in the name of Louis XIV, King of France. His was no mere adventure, directed by chance, but a dream of vast empire; and his successful descent of the Mississippi, from the mouth of the Illinois River to the Gulf, gave a solid basis of discovery for the claim he put forth.



SIEUR DE LA SALLE
Explorer of the Mississippi

The son of a rich merchant in Rouen in Normandy, La Salle had forsaken a Jesuit novitiate to emigrate in his 24th year to Canada. There he heard Indian tales of a great river called the Ohio; and in 1669 set out in search of it, by way of the St. Lawrence and Lake Erie, tracing its course certainly as far as the rapids at Louisville. In 1671 he traversed Lake Huron to Lake Michigan, and by way of the Chicago portage reached the Illinois River before turning back. Gradually there formed in his mind the idea of winning a splendid new empire for France. His plans, as fully worked out, were twofold: (1) to build forts and trading centers at various points along the St. Lawrence, the Great Lakes, and the Mississippi; and (2) to plant a colony at the mouth of the Mississippi. Thus he purposed to occupy the region explored by Marquette and Joliet (*see* Marquette).

Twice La Salle journeyed to France to get the royal approval of his plans. Early in August 1679, after long and weary efforts spent in preparation, he launched on the Niagara River, above the Falls, a little vessel, which he called the *Griffin*, to bear him through the lakes to the Chicago portage.

But almost insurmountable difficulties barred his way. The *Griffin*, with its cargo of valuable furs which La Salle expected to pay the heavy costs of the expedition, was lost on its way back to Niagara. Twice La Salle was forced to travel hundreds of miles through the wilderness back to his base of supplies on the St. Lawrence. His fort, named Crèvecoeur, near the site of the present city of Peoria, Ill., was destroyed by hostile Indians; and for weeks he searched for his men, under his faithful follower Henri de Tonty, before he found them.

Not until Feb. 6, 1682, did La Salle's canoe float out from the Illinois into the waters of the Mississippi. Floating ice for a time delayed the voyagers, and at one time six days were spent in hunting for a comrade lost on a hunting trip. Their course led them past the mouth of the Missouri, with its muddy torrent, past the Ohio, past swamps and cane-brake, and past regions where sounded at night the booming of the Indian drum and the shrill cries of the war-dance. In the land of the Arkansas they visited the town of a friendly chief, with large square dwellings built of sun-baked mud and arched over with dome-shaped roofs of canes. Finally, early in April, they emerged on the broad bosom of the great Gulf—"limitless, voiceless, lonely as when born of chaos, without a sail, without a sign of life."

Landing, La Salle took possession of the country for France. He erected a column bearing the arms of France, and buried a leaden plate, on which was inscribed a record of his discovery and some Latin sentences telling that all the land drained by the Mississippi and Ohio rivers was claimed for the French.

By building forts and trading centers along this route—the most important being Fort St. Louis near the present Ottawa, Ill.—La Salle carried out the first part of his plan. After his return to Quebec he resolved to go to France and get men for a colony which he wished to plant at the mouth of the Mississippi and thus carry out the second part.

Having succeeded in France in fitting out this colony, he sailed with four vessels early in July 1684 in search of the Mississippi River by way of the Gulf of Mexico. Bad fortune, however, caused him to miss its mouth and land in Spanish territory, at Matagorda Bay, 400 miles to the west. Battle, famine, and disease soon wore down the numbers of the little colony and bred mutiny. While attempting to make his way back overland to Canada for supplies, he was assassinated, on the bank of Trinity River, Tex., in March 1687, by several of his followers. (For La Salle's route *see* historical map in the article United States.)

The disastrous end of La Salle's enterprise must in part be ascribed to his own character. Wrapped in his splendid dream, reserved and haughty, he gave his confidence, his love, to no one but Tonty. By his Indian allies he was worshiped as a superior being, but his evident superiority was resented by his white followers. He had powerful enemies in Canada and in France who were able to thwart him. But before his death he did a great work for France, work which entitles him to be regarded as one of the most remarkable of all the explorers of America. He had discovered the Ohio River, and probably the Illinois, and he had traced the Mississippi from its upper waters to its mouth.

LAS CASAS, BARTOLOMÉ DE (1474–1566). As soon as the Spaniards settled in the West Indies, their need of laborers for their mines and plantations led them to make slaves of the natives. But the redmen were unaccustomed to such hard labor and died by the hundreds; hundreds more were killed by the Spaniards, before Bartolomé de Las Casas, the "Apostle of the Indies," interfered in their behalf.

As a young man Las Casas had first become interested in the redmen when his father brought back to him, on his second voyage with Columbus, an Indian slave. In 1502 he decided to go to the New World and settle on his father's estate in Haiti, or Hispaniola as it was then called. At that time he owned slaves, as did all of the other Spaniards of the colony, although he treated them more humanely than most did. Even after he was ordained a priest, he saw no wrong in slavery until 1514. Then he set free all of his slaves.

When his neighbors refused to follow his example, he journeyed to Spain to beg the Spanish government to free the Indians. The regent was persuaded, and issued an order that Indians must be paid for their work unless they were cannibals. He also appointed Las Casas "Protector of the Indians." Las Casas suggested that, as negroes were a hardier race than were the Indians, they should be imported to do the work in the mines. In later life he came to believe that any kind of slavery was wrong.

At first his efforts in behalf of the Indians met with little success, for the government made no effort to enforce its laws against slavery. But before his death he had the satisfaction of seeing a process of gradual emancipation begun. Las Casas' book, 'A Brief Relation of the Destruction of the Indies', told such gruesome truths regarding the Spaniards' treatment of the redmen that for more than 300 years it remained unpublished.

The MOTHER-TONGUE *of the* CIVILIZED WORLD

LATIN LANGUAGE AND LITERATURE

NO one who is ignorant of Latin can be called educated, for without it we have not complete mastery even of our own language, and the foundations of half of human knowledge are a sealed book to us. The whole structure of our civilization is based on the creations of Latin genius, which we can understand only imperfectly without knowing its language. For, to quote the eloquent words of J. W. Mackail, "It is in their literature that the inner spirit of the Latin race found its most complete expression. In the stately structure of that imperial language they embodied those qualities which make the Roman name most abidingly great—honor, temperate wisdom, humanity, courtesy, magnanimity; and the civilized world still returns to that fountain-head, and finds a second mother-tongue in the speech of Cicero and Vergil."

When people nowadays talk of inventing a world language, the idea sounds visionary to many of us. But such a language really existed for many centuries—from just before the dawn of the Christian era almost to our own times. This world language was Latin. It began its cosmopolitan career as a conquering tongue by following the victorious Roman legions over Europe, Asia, and Africa, until at length it became the speech of civilization, and was spoken in one form or another from the British Isles to the Persian Gulf.

In the mouths of the unlearned and careless majority, the Latin of everyday life kept steadily changing in pronunciation, grammar, and vocabulary. Thus various dialects grew up in different localities, which in the course of a few centuries developed into the group of related tongues called the "Romance languages" (*see* Romance Languages). But literary Latin, which remained the language of religious and political life as well as the language of scholarship, underwent little change. In the Middle Ages scholars, priests, and statesmen could travel the length of Europe without learning the languages of the various countries, since in every community there were sure to be men of learning who talked Latin; and state documents, as well as scientific, philosophical, and other works of scholarship were written exclusively in Latin.

Even today Latin is something of a world language, though in a different way. One-third of the English that we write is Latin, and we can hardly speak a sentence without using some such words as "wall," "street," "city," "army," "justice," "religion," and thousands of others that we have inherited from the ancient Romans (*see* English Language). In the Romance languages of Europe — Italian, French, Spanish, and the like—the proportion of Latin words is even higher than in English.

In the Indo-European family of languages, Latin is a younger sister to Sanskrit and Greek. (*See* Philology.) At the time when Greece was creating the greatest poetry of all time, Latin was still only a dialect spoken by a few tribes in the vicinity of Rome. And it was not until the 3d century B.C. that it had been planted throughout Italy, superseding for the

most part the other Italic dialects; and not until the first century that it had been developed into a superb literary language, a marvelous instrument for prose and poetry. The Latin of this so-called Golden Age had a stateliness and an artistic finish of style that have never been surpassed in any tongue. The masters knew the limitations of their instrument. Latin was not adapted to expressing fine shades of meaning; therefore the great Roman writers strove rather for clearness and precision. It had not the variety of sound that Greek possessed through its more numerous vowels and diphthongs and its musical accent, and the monotony of Latin was further increased by the great number of long syllables. But this very monotony in the right hands gave weight and dignity, and a beautiful rhythmic cadence.

The Beginnings of Literature

Just what Latin literature might have become if it had been left to itself, as the Greek was, we shall never know. Certainly it would have been very different. Before the invasion of Greek culture that followed the Roman capture of Tarentum, the greatest of the Greek colonies in southern Italy (272 B.C.), the Romans had developed a meter of their own and the beginnings of a literary form. Their so-called Saturnian verse was apparently based upon accent as our verse forms are, and was a vigorous, rough-and-ready line capable of adaptation to a variety of poetical purposes. The Greek measures which Latin afterward imitated were based not on accent but upon long and short syllables.

In the languages of many uncivilized peoples nowadays the first written book is a translation of the Bible. In Rome the first book seems to have been a translation of the 'Odyssey'. This was made in the latter half of the 3d century B.C. by a Greek, Livius Andronicus, who was brought to Rome as a slave after the capture of Tarentum. Andronicus translated some Greek plays as well. The next poet, Gnaeus Naevius (died about 200 B.C.), went on translating or imitating Greek drama, often using subjects from Roman history and introducing allusion to contemporary politics. He made use also of the pattern given by Andronicus' 'Odyssey' to write an epic of the first Punic war. Thus, from the very beginnings Roman literature was based on Greek models.

On this foundation Quintus Ennius (239–169 B.C.), the most important Roman writer before the age of Cicero, reared the stately edifice of his 'Annales'—a tremendous epic history of the Roman state, which is unfortunately known to us by only a few fragments. In this poem Ennius remolded the still rude and clumsy Latin to fit the stately flow of the Greek hexameter verse form (*see* Greek Language and Literature), thus influencing the whole later history of the language. A tireless and prolific worker, Ennius also produced an astonishing number of translations from the Greek tragedy and comedy, as well as many original dramas, and other works which won for him the title "father of Roman poetry."

The first Latin writer whose works have survived in any considerable body is Titus Maccius Plautus (254?–184 B.C.), the greatest comic dramatist of Rome. Twenty of his farcical plays have been preserved more or less intact across the hazards of the centuries, making him one of the world's chief dramatic influences. His plots—which he borrowed from the later Greek comic poets—have in turn furnished a rich mine for later playwrights, including Shakespeare and Molière; and many of the stock characters of the comic stage of today are mere adaptations of the types which he took from Greek comedy.

Though Plautus got the substance of his plots and characters from Greek sources, his manner and spirit were essentially Roman. His great successor Terence, who was born about the year Plautus died, avoided as a blemish any impulse toward originality or the expression of national quality, and set himself to copy his Greek originals with slavish fidelity. There is nothing Italian about his work but the language. His merit is that he thus brought into Roman literature the Greek standards of elegance, artistic perfection, and moderation; his defect, that he "struck Latin literature at the root with the fatal disease of mediocrity." His six plays, which all survive, have served as models of classical perfection to every generation of playwrights since, and some of his exquisitely polished lines, such as *Homo sum: humani nihil a me alienum puto* ("I am a man; and I think nothing pertaining to mankind foreign to me") have passed into the currency of common speech.

In addition to these poets, we have crusty old Cato the Censor (234–149 B.C.), who was the first writer of prose history in Rome to use his native tongue, and whose published speeches Cicero sincerely admired; and Lucilius (about 180-103 B.C.), who wrote the first satires that were satires in the modern sense of witty social criticism. These are all the names we need to remember from the early period of Latin literature.

The Golden Age

The Golden Age, as we call the period when Latin literature reached its greatest splendor, covers about a century (80 B.C.–14 A.D.), from the beginning of Cicero's rise as an orator to the death of the Emperor Augustus, under whose patronage arts and letters flourished as never before in Italy. Cicero brought Latin prose as an instrument for oratorical, philosophical, literary, and epistolary expression to such a pitch of perfection that the adjective "Ciceronian" is a synonym for "classically perfect," "polished." (*See* Cicero.) In the words of the greatest of modern critics of Latin literature (J. W. Mackail), "Cicero's unique and imperishable glory is that he created a language which remained for 16 centuries the language of the civilized world, and used that language to create a style which 19 centuries have not replaced, and in some respects have hardly altered." Different but in no way inferior to the stately sonorous periods of Cicero was the simple

straightforward style of Caesar, whose 'Gallic Wars', recording his campaign in Gaul, will ever remain a model of prose narration (*see* Caesar).

The other chief writers of the Ciceronian period are Sallust, Lucretius, and Catullus. Sallust (86–34 B.C.) is placed in the front rank of Roman historians by the accounts he has left us of the Catilinarian conspiracy and the Jugurthine war. The philosophical epic *De rerum natura* ("Concerning the Nature of Things") of Lucretius (96?–55 B.C.) is perhaps the most original and certainly next to the 'Aeneid' the greatest poem in Latin. The love poems of Catullus (84–54 B.C.) present the joy and pain of the passing moment with the same vividness that we find in the sonnets of Shakespeare.

With these names we pass from the literature of the Roman Republic to that of the Empire. As the giants of the Ciceronian period had perfected Latin prose, so their later contemporaries of the Augustan age perfected Latin verse. First of these both in time and genius was Vergil (70–19 B.C.), "the Homer of Rome." His great national epic, the 'Aeneid', is one of the supreme masterpieces of the world, yielding place only to the matchless 'Iliad' and 'Odyssey'. In his hands the Latin hexameter became "the stateliest measure ever molded by the lips of man," and the unforgettable pictures he wrought—of the last agony of Troy, of the wanderings of the "pious Aeneas," of the tragic passion of the ill-starred Dido—have moved to tears generation after generation as nothing else in all literature has done (*see* Vergil).

In the field of lyric and satiric verse, the genial and accomplished Horace (Quintus Horatius Flaccus, 68–8 B.C.) triumphed as surpassingly as did Vergil with the epic. He embodied his philosophy of "idealized common sense" in phrases of such unforgettable charm that many of them have become as familiar as proverbs. "The schoolbook of the European world, the 'Odes', have been no less for 19 centuries the companions of mature years and the delight of youth." In his mildly ironical 'Satires' and 'Epistles' he left the most complete and vivid picture we have of life in the Augustan age.

The Elegiac Poets

There was nothing of Horatian self-restraint and even-souled calm in the brief erratic life of Sextus Propertius (50?–15 B.C.) who flashed on the Roman world as a boy of 20 with a volume of passionate colorful poems celebrating his love for the capricious "Cynthia." A gentler and more refined young poet of the same time was Tibullus (54?–19 B.C.) in whom grace and melodiousness took the place of Propertius' fire. These two poets both used the metrical form called the "elegiac," which their brilliant contemporary Ovid (43 B.C.–18 A.D.) polished to the same perfection to which Vergil had brought the hexameter and Horace various lyrical forms. A facile and copious writer, Ovid became the uncrowned laureate of the later Augustan age, whose glittering coldness and cynical worldliness he so perfectly embodied in his licentious 'Art of Love'. For us the most attractive of his many productions is his romantic 'Metamorphoses'—a fascinating narrative poem as long as the 'Odyssey' in which he has interwoven a vast number of stories from the ancient mythology.

The Augustan age was preëminently the Golden Age of Latin poetry, but to this time belongs also the most famous of the Roman historians. Livy (59 B.C.–17 A.D.) is particularly noted for the splendor of his rhetoric. He preferred literary effectiveness to historical accuracy, so that his narrative of Rome from its founding is more like a prose epic, a series of splendid pictures, than a critical history.

The Silver Age

After Ovid and Livy the decline of Roman literature sets in rapidly. The so-called Silver Age that followed the reign of Augustus is so very literary that it scarcely interests the general reader. All work, whether in prose or verse, suffered from the custom of public readings. The author was tempted into writing brilliant passages to win the praise of his listeners even though he injured his work as a whole.

The satirist Juvenal (60?–140 A.D.) and the epigrammatist Martial (40?–104 A.D.) belong to this later period. Juvenal's savage castigations of Roman life have been translated and imitated by many English poets. These men are chiefly interesting to us today for the picture they give of Roman life in the days of the empire. The tragedies of Seneca—Nero's tutor—with their ghosts and their dismal lack of acting qualities, were the chief models for tragedy, as Plautus and Terence were for comedy, among the early writers of English drama. Today we read them as curiosities, though we can still enjoy Seneca's philosophical studies written in letter form.

Tacitus (55?–120), whose perverse and vivid style has sometimes been compared to that of Carlyle, gives us a number of valuable historical pictures. The 'Germania' is our only view of central Europe under the early Roman Empire. His 'Agricola' is a very beautiful piece of biography. And what remains of his 'Annals' and 'Histories' is our chief source for the events of the first century of the Roman Empire. The historian Suetonius (75?–160), a writer of much less distinction than Tacitus, had the advantage of being one of Hadrian's private secretaries, and could therefore write his very gossipy 'Lives of the Twelve Caesars' from documentary sources.

Perhaps the most interesting writings in Silver Latin are the letters of Pliny the Younger (61?–113). The most famous is the one telling of the death of his uncle Pliny the Elder in the eruption of Vesuvius that buried Pompeii. As a whole these letters give a racy picture of the time that is also pictured in Juvenal and Tacitus. Pliny the Elder (23–79) was the author of a 'Natural History', which is a priceless storehouse of information about the science of ancient times. Two other works of the Silver Age strike a more modern note, the literary criticism of Quintilian and the 'Satyricon', the prose novel of Petronius Arbiter.

contained in the Easy Reference Fact-Index at the end of this work

With the gradual breakdown of the Roman Empire which followed the death of Marcus Aurelius (180 A.D.) literature almost disappeared. Although there were brief flickers of activity from time to time, the genuine Roman spirit was dead. Latin survived as a learned language—and still survives, for every year sees a considerable output of scholarly research written in Latin—but Latin literature may be said to have ended in the 2d century.

As Latin has never ceased to be spoken as a learned language, its pronunciation has been corrupted by the pronunciation of the various languages of Europe. Thus the name *Cicero* is commonly pronounced in France as *Sisero*, in Italy *Chichero*, in England *Sisero*. In most schools of the United States the so-called Roman method of pronunciation is used, which attempts to approximate as nearly as possible to the pronunciation of Cicero's time. This gives the vowels about the same sound as in French and Italian and the consonants C and G are always given their hard sound. Thus the word Cicero is pronounced *Kikero*.

Latitude and Longitude. To indicate accurately the position of a place on the surface of the earth, geographers imagine the globe to be covered with a network of lines regularly spaced. Those running east and west—parallel to the Equator—are called "parallels," and the distance between them is measured in "degrees of latitude." Those running north and south—from pole to pole—are called "meridians," and the distance between them is measured in "degrees of longitude." Instead of marking each degree, which would make a confusing network of lines on the map, every fifth or tenth degree only is usually marked. If you examine a map of the United States, you will see that parallels and meridians form the boundaries of many of the states.

HOW THE EARTH IS SPACED OFF



The imaginary lines encircling the Earth parallel to the Equator (0°) are the Degrees of Latitude, while the lines intersecting at the Poles and numbered in this picture at the Equator are the Degrees of Longitude.

In numbering the parallels, we begin with the Equator as zero and count north and south. Thus the first degree north of the Equator is one degree north latitude, usually written "lat. 1° N."; and the first degree south of the Equator is one degree south latitude or "lat. 1° S." Since the distance from the Equator to either of the poles is one-fourth of a circle around the earth, it will measure one-fourth of 360 degrees (the number of equal parts into which a circle is divided), which equals 90 degrees. Thus 90 degrees north latitude marks the position of the North Pole, and 90 degrees south latitude that of the South Pole.

In numbering the meridians most countries by agreement have chosen as the point of departure the meridian passing through Greenwich, England, where the British Royal Observatory was established in 1675. Beginning with this as 0°, the first degree east of Greenwich is called one degree east longitude, or "long. 1° E."; the first degree west is "long. 1° W."; and so on until 180 degrees (half of 360) have been measured off eastward and westward. The 180th meridian is on the other side of the earth, exactly opposite to the one which passes through Greenwich, and with it, it forms one of the great circles which pass through the poles around the earth. This meridian is neither "east" nor "west," for both the east and west counts end here. Other meridians which have at times been used in calculating longitude are the ones passing through Washington (D.C.), Ferro (in the Canary Islands), and Paris (France).

As you can readily see, the circles forming the parallels decrease in size from the Equator to the poles. The meridians all meet at the poles, therefore the North Pole cannot be said to have longitude. It has only latitude (lat. 90° N.), and from there the only direction is south, just as from the South Pole the only possible direction is north. A degree of longitude measured on the Equator is a little more than 69 miles. This distance decreases until at 30° it is a little less than 60 miles, at 60° about 34½ miles, and at the poles, zero. (For table of values, *see* Longitudes.)

A degree of latitude measured from the Equator to the first parallel north or south is about 68¾ miles; but between lat. 45° and lat. 46° it is a little more than 69 miles. If the earth were a perfect sphere the degrees of latitude would, of course, all be an equal distance apart; but the earth is flattened at the poles and bulging at the Equator, which accounts for the difference noted above (*see* Earth).

The determination of both latitude and longitude depends upon astronomical observations. Latitude is found at sea by measuring with an instrument called a sextant the sun's angular distance above the horizon when it is at the highest point or "zenith"—that is, at exact noon. From astronomical tables which give the "declination" of the sun (its distance north or south of the Equator for that day) the latitude is then found. One of the simplest ways to compute longitude at sea is by noting the difference in time between that given by the observation of the sun at noon, and that given by a chronometer or watch set to Greenwich time. The longitude is the amount by which noon by Greenwich time is earlier or later than noon at the observer's point; one hour's difference in time means 15° difference in longitude. The wireless telegraph dispatches now enable mariners to keep their watches accurately set to Greenwich time.

Other imaginary lines on the earth's surface are the two tropics—the Tropic of Cancer (23½ degrees north of the Equator) and the Tropic of Capricorn (23½ degrees south of the Equator). These two parallels

mark off the belt around the middle of the earth in which the sun, at some period of every year, is directly overhead. Elsewhere the sun's rays never shine straight down from the zenith. The tropical belt, therefore, is the region of greatest heat.

The polar circles are the same distance from the poles that the tropics are from the Equator. The Arctic Circle, therefore, is 66½ degrees north latitude, and the Antarctic Circle is 66½ degrees south latitude. They mark off the regions around the poles where each year there is at least one day when the sun does not set, but is visible above the horizon for the full 24 hours. (*See also* Maps.)

LATVIA. Latvia or Letvia—the "land of the Letts"—is a new name that has appeared on our maps since November 1918; it comprises most of the former Russian provinces of Courland and Livonia and lies between Esthonia and Lithuania on the Baltic Sea. The Gulf of Riga makes a deep indentation on the northwest coast. Latvia possesses about 340 miles of seacoast, and there are good harbors at Riga, Libau, and Windau.

Much of the surface of the country is very low, and there are many marshes and peat bogs; but part of Livonia consists of wooded hills, picturesque deep valleys, and charming lakes. Latvia is mainly an agricultural country, but the people are passing from agriculture to industrial life. Rye, oats, barley, flax, potatoes, and some wheat are raised. The principal exports are flax and timber. Riga, the capital, with a population of 570,000, is the chief seaport, and an important center of trade and manufacture.

The Letts, who make up about 78 per cent of the population, are with the Lithuanians a separate branch of the great Indo-European family, akin to the Slavs. Unlike the Russians, who are Greek Catholics, the majority of the people are Protestants. Education is on a much higher level than in Russia, most of the children receiving regular instruction. This new republic, a product of the World War and of the Russian Revolution, has an area of about 20,000 square miles and 1,500,000 people.

In the 13th century what is now Latvia was a part of the territory conquered and Christianized by the crusading Teutonic knights. It was added to Russia by Peter the Great, and remained a part of that country until it was established as a separate republic in 1918.

LAUNDRY. A trip through a modern laundry will show us much marvelous machinery, the greater part of which has been developed in the last quarter of a century. After the soiled goods have been counted, marked, sorted, and disinfected by steam, they go to the washing room. Here are rows of large metal drums, within each of which a perforated cylinder revolves, first in one direction, then in the other, thus loosening the fibers of the goods and sending the soapy water through them to dissolve the dirt. Water and steam are let in through pipes, and so the same machines can be used for boiling, rinsing, and bluing.

The hand washerwoman would next put her clothes through a wringer, but in a laundry a machine known as the hydro-extractor removes most of the water far more quickly. You know that if you whirl a wet cloth rapidly water will fly from the cloth in a circle of drops. The hydro-extractor works on this principle. A metal perforated drum revolves inside a fixed metal drum so fast that the edge of the drum is traveling faster than an express train. So much of the moisture is taken from the clothes in this machine that when they are removed, to be caught on hooks passing over an endless chain traveling through the drying room, one trip is sufficient to dry them.

Ironing by Machinery

Now the clothes are ready for starching and ironing. And what an array of ironing machines there are! Most of them have some form of hard-polished surface, heated either by steam or electricity. This presses the clothing against another smooth surface which is usually padded much like the ironing board at home. Some of the machines are adapted especially for ironing cuffs and collars, one machine having a capacity of 250 to 300 dozen collars an hour. Flat pieces, such as sheets, table linens, and towels, are ironed on a mangle, which is essentially two long heated rollers. Special padded forms are used for pressing shirtwaists and fancy skirts, and there are also machines for stretching, shaping, and dampening. Much of this machinery driven either by city water pressure or by electricity has been adopted for use in the laundry room of the ordinary home, making the work of the house much lighter.

The steam laundry industry and the manufacture of laundry machinery were developed chiefly at Troy, N.Y., the center of shirt, collar, and cuff manufacturing. In many Chinese laundries scattered through the country most of the work is still done by hand. You have noticed that when you take your clothes to a Chinese laundry you receive a torn strip of paper marked with Chinese characters to serve as an identification check. You may be interested to know that the words written usually form a Chinese proverb, but sometimes merely a casual remark about the weather or even a comment on some peculiar characteristic of the customer.

Primitive Laundering Methods

The early laundress washed her clothes in a running brook or river, often pounding the clothes with a paddle or treading upon them to hasten the task. This primitive method of washing is still the usual one in many parts of the world—in Italy, parts of France, and far-off India. In some remote places in Germany and Norway, clothes are washed only twice a year. Long lines of boats filled with accumulated clothing may be seen coming down the streams in spring and autumn until an available spot is found for the work. Community or municipal laundries are maintained throughout Switzerland, and public washhouses are kept up in many of the cities of Italy and other parts of Europe.

Laurel. The best known species of these hardy shrubs is the American or mountain laurel, which is found from Pennsylvania southward, and is especially abundant in the mountains of the Carolinas and Tennessee. It is a shrub varying from 2 to 20 feet in height. During June and July it bears beautiful white or rose-colored flowers, some of which exhale a pungent perfume. The leaves are rather large and lance-shaped and are shining and leathery.

The bay or sweet laurel (*Laurus nobilis*), having yellowish green flowers, is found in the Mediterranean districts of Europe and in Great Britain. It belongs to the family which includes the sassafras and camphor, trees remarkable for their aromatic qualities. From the berries and other parts of the sweet laurel is distilled an aromatic oil used in the manufacture of toilet waters. The dried leaves also are used for flavoring in cookery and pickling. The ancient Greeks used the entwined twigs of this tree to crown victors of the Pythian games. The tree was sacred to Apollo, and the nymph Daphne when pursued by Apollo was, in answer to her prayers, changed into a laurel. The custom of placing a laurel crown on the brow of poets dates from the Middle Ages.

THE BELLE OF LAUREL LAND



This is the American Mountain Laurel in bloom, the most beautiful of the Laurel sisters. We may say that Miss Laurel is wearing her bridal wreath; for blossoming time is the wedding time in the world of flowers.

The mountain laurel belongs, not to the classic old-world laurel family (*Lauraceae*), but to the heath family (*Ericaceae*). The name of laurel is given also to shrubs of the rose and other families. Old-world laurels are found in southern Asia as well as in Mediterranean Europe. Cases of poisoning have been traced to wild honey gathered from the pretty flowers of some species of laurel, while the leaves of other species are deadly to live stock. The beauty of the shrubs make them popular among gardeners and they are extensively cultivated.

Scientific name of the American laurel, *Kalmia latifolia*. Leaves evergreen, entire, dark in color, pointed at both ends. Flowers rose-pink, fading to white; numerous, in terminal clusters; one pistil; 10 stamens. Fruit a round brown capsule. Stem shrublike, woody, stiffly branched.

Laurentian Plateau. Though it has lost some of its ancient grandeur, no part of Canada is more famous for the beauty and diversity of its scenery than the extensive highland area called the Laurentian Plateau. It represents an area which in early geologic history was mountainous, but was long ago reduced by erosion or wearing down to the semblance of a plain. Since that time it has been uplifted somewhat, the uplift converting the former plain into a plateau. Subsequent stream erosion has roughened its surface, and the northeastern portion, by combined uplift and erosion, has become ruggedly mountainous. The Saguenay, a tributary of the St. Lawrence, with great fiordlike cliffs rising in some places to 1,500 and 1,700 feet, has some of the most sublime river scenery in the world, and is yearly visited by thousands of tourists. The Muskoka lake region in Ontario, with almost 1,000 island-dotted lakes and ponds, surrounded by beautiful forest scenery, is another favorite summer resort. The whole plateau is so covered with winding waterways and lakes that, by making occasional portages, one can travel in almost any direction by canoe.

Shaped like a great "V," with the Hudson Bay in the center, the Laurentian Plateau in the widest use of the term covers 2,000,000 square miles—more than half of Canada. On the east, the area to which the term was first applied, it includes a considerable part of Labrador and Quebec; on the south it extends through northern Ontario as far as Lake Superior and the Adirondack Mountains, and perhaps parts of northern Michigan and Wisconsin may be looked on as isolated outlying remnants. It then spreads northwest, east of the Rockies, to the Arctic Ocean. This area is underlain by rock formations which are among the oldest known. The average elevation is 1,500 and the highest some 7,000 feet. From the edges of the plateau, which are highest in Quebec and Labrador, the land dips gently down to sea-level around Hudson Bay. Within this plateau is the great water divide of the so-called Height of Land.

The southern part is covered by immense forests, which up to the present have been the chief wealth of the region, and also contains important mineral deposits of iron, nickel, copper, and silver. While it cannot compare in fertility with the plains of eastern and western Canada, the soil of the valleys is often very rich and productive. The "barren lands" in the north, which are above the timber line, are unpopulated and hardly visited by whites. Great herds of reindeer and musk-ox roam on its plains, hunted occasionally by Indians and Eskimos, and the region may in the future become a great source of supply for meat from the reindeer.

For any subject not found in its alphabetical place see information

Laurier, Sir Wilfrid (1841–1919). The son of humble French-Canadian parents, the Right Hon. Sir Wilfrid Laurier, prime minister of Canada from 1896 to 1911, was born in 1841 at St. Lin, Quebec. He was educated at the schools of his native parish, at L'Assomption College, and at McGill University, Montreal; and in 1864 he entered the practice of law in Montreal. Very early, however, his interest in politics overshadowed his interest in law. He identified himself with a group of advanced Liberals in the province of Quebec who were known as "the Reds," and in 1871 he was elected a member of the provincial legislature. Three years later, in 1874, he was elected a member of the Canadian House of Commons; and in this body at Ottawa, where he played a continuous and most distinguished part until his death in 1919, he found his lifework.



SIR WILFRID LAURIER

Laurier's rise to the "front benches" in Parliament was rapid. In 1877 he became minister of inland revenue in the Mackenzie administration. On the defeat of this administration at the polls, in 1878, he went into opposition; but in 1887 he was chosen, though a French-Canadian and a Roman Catholic, to succeed Edward Blake as leader of the Liberal party. Under his guidance, the fortunes of the Liberals soon revived. Though defeated in the general elections of 1891, he swept the country in 1896 on the question of separate (i. e., Roman Catholic) schools in Manitoba—a question on which he found himself at variance with the official heads of the Roman Catholic church in Quebec. He was called upon to form an administration; and thus he entered on that 15-year tenure of the prime ministership which was to make him one of the great figures of Canadian history. He was the first French-Canadian to hold this important office under the Confederation.

His work as prime minister of Canada falls naturally under two heads. On the one hand, there is the very important contribution he made toward determining the relations between Canada and the mother country; on the other, there is the contribution he made toward the building up of Canada itself.

In his attitude toward Great Britain, Laurier may perhaps best be described as a Liberal imperialist. When the South African War broke out, not long after his advent to power, he dispatched several contingents of Canadian volunteers to South Africa, to fight there the battles of the empire. Then, and always, he was thoroughly loyal to the British Crown. But he was also loyal to Canada. He conceived of the British Empire as an alliance of free and equal nations; and he opposed every attempt, from whatever quarter, to limit Canadian freedom. It is a significant fact that it was during his period of office that the last British soldier was withdrawn from Canadian soil, and that the beginning of a Canadian navy was made. He was a prominent figure in the Colonial conference held in London in 1897, on the occasion of Queen Victoria's Diamond Jubilee, and was made a knight and a member of the Imperial Privy Council.

So far as his domestic policy was concerned, Laurier was guided by a splendid faith in Canada's future. His immigration policy brought into the country hundreds of thousands of settlers; and his railway program looked toward the spanning of the country with not one transcontinental line, but three lines, of railway. "Build up Canada" became the watchword of his government. What proved his political ruin, however, was his attempt to carry out this idea by means of reciprocity in trade with the United States. In the general elections of 1911, which were fought over this question, he was defeated; and Mr. (now Sir) Robert Borden, the leader of the Conservatives, succeeded him as prime minister.

When the World War broke out, as leader of the opposition he gave the government his whole-hearted support. When, however, in 1917 the government adopted compulsory military service, Laurier found himself unable to continue his support; and he had the tragic experience of seeing a large element in his own party desert him. His policy was defeated in a general election; and on Feb. 17, 1919, he died, still at variance with many of his former followers.

Sir Wilfrid Laurier was one of the best loved of Canadian statesmen. With his picturesque personality, his graceful French ways, his wonderful eloquence, he captured the imagination, not only of Canada, but of the world. Though French was his native tongue, he became one of the greatest living masters of English oratory. His dearest ambition was to bring about peace and harmony between the two races in Canada, the French and the English. Just how near he came to realizing this ambition, few people even yet perhaps understand; and if, in the last years of his life, he disappointed some of his admirers, the bitterest of his opponents never ventured to dispute his integrity and sincerity.

Lava. The more or less completely melted rock discharged from volcanoes is called lava. Molten lava is a very thick fluid saturated with gases and steam. Its fluidity depends on its temperature, the amount of vapors it contains, and its chemical composition. Those lavas which contain not more than 58 per cent of silica are called basic lavas, and melt at about 2250° Fahrenheit. Lavas containing 66 per cent or more of silica are acid lavas and remain more or less pasty even at 3100°. Lavas of Stromboli in the Lipari Islands (where Vulcan [Hephaestus] is fabled to have had his forge), the

Hawaiian Islands, and Skaptar Jokul in Iceland are basic. The rate of flow of basic lava is faster than that of acid lava, and hence the cones of such volcanoes are low and have gentle slopes. The lavas from Mt. Shasta, Mt. Hood, and Mt. Rainier on the Pacific coast, and of Vulcano of the Lipari Islands are acid, and so these mountains have high steep cones. Lavas usually flow slowly, rarely as much as a mile an hour.

If lava cools so quickly that there is no opportunity for the constituents to crystallize, it is glassy and is called *obsidian*. Lava which has large crystals embedded in a matrix of glasses of small crystals is called *porphyry*. The top of lava is often frothy from bubbles of gas and is then called scoriaceous. *Pumice* is rock froth so light that it will float on water. Powdered pumice is used in grinding glass stoppers for bottles and in making soaps for mechanics, for polishing wood, ivory, metals, etc. Great quantities are exported from the Lipari Islands. A product similar to pumice results when a jet of steam is blown through the melted slag from an iron furnace. Such pieces may be seen floating along the shores of Lake Michigan from the iron works at the southern end of the lake. (*See* Volcanoes.)

OUT OF THE FIERY FURNACE



This is a mass of cooled and hardened lava on the edge of the crater of Kilauea on the island of Hawaii. Queer looking thing, isn't it? But stranger still is the fact that the islands of the Hawaiian group, like many others in the Pacific, were built up in just that way, by the boiling out of lava from the floor of the sea, each successive outburst piling up more and more until at last the top rose above the surface.

Law. Did you ever wonder just what "law" is, and how it came to be? A law is a rule for men's actions which is enforced by the state. Long ago when people lived in tribes and family groups, "custom" was about the only law there was. After these customs had been established many years they became fixed as laws, and those who tried to do things differently were punished. It was such a body of traditional or "unwritten law" that the English tribes (Angles, Saxons, and Jutes) brought with them when they conquered Britain. In medieval England a custom was held to be good law if it had been in force (in the old phrase) "from a time when the memory of man runneth not to the contrary." Modified by the decisions of courts, and in other ways, much of this old "customary law" survives in England and America under the name of the "common law."

In ancient Rome lawgivers, legislative enactments, and the opinions of trained jurists gradually built up a more scientific body of law, which the Emperor Justinian codified in what came to be called the Roman "civil law." So logical and just were its principles that it has been called "crystallized reason." In the latter part of the Middle Ages the study of this Roman law was revived in the universities of Europe; and today the law of all countries of western Europe, with the exception of England, is based largely on the Roman law.

"Statute law" is law made or enacted by a legislative body, such as Parliament, Congress, or a state legislature. "Canon law" is the law which arose in the Middle Ages dealing with church matters. It was administered in separate church courts, with the pope at the head; and there were numerous conflicts of jurisdiction between the church and the secular courts.

"Equity" is the name that is applied to a body of legal principles which arose in England to remedy the injustices which were done by a strict application of the letter of the law. For a long time (until 1873) the English "courts of justice" were distinct from the "equity" tribunals, the latter being under the lord chancellor.

"Martial law" is sometimes declared by the executive of a state in time of danger from invasion or insurrection. This means that the ordinary law is suspended and everyone is put under the control of the military authorities. Martial law is not the same as "military law," for military law is the set of rules by which the members of the military organizations are governed.

"Parliamentary law" is not "law" at all, but merely the body of rules and regulations by which the proceedings of deliberative assemblies are governed. "Jurisprudence" is the name given to the science which deals with the study and classification of laws. (*See* International Law.)

Lawrence, James (1781–1813). "Don't give up the ship!" cried out young Captain Lawrence, commander of the frigate, *Chesapeake*, as his men were carrying him below, mortally wounded, after a bloody engagement with the British frigate *Shannon*. The cry of this American naval officer, used later

by Captain Perry on his flag at the battle of Lake Erie, is a war-cry that has never since been forgotten.

James Lawrence, a native of Burlington, N.J., entered the navy as a "middy" at the age of 17, and rose to the rank of lieutenant in 1802. During the war with the Tripoli pirates (1804–05) he fought in the Mediterranean as second in command to Decatur. At different times he commanded the *Argus*, *Vixen*, *Wasp*, and *Hornet*. As commander of the last named, early in 1813, he fought a memorable duel with the British sloop-of-war *Peacock*, and captured it after a spirited 15-minute engagement. For this inspiring exploit he received a vote of thanks from Congress and a gold medal.



JAMES LAWRENCE
The Man Who Wouldn't Give up the Ship

A few months later found him in command of an indifferently trained crew on the *Chesapeake*. This had suffered the humiliation on June 22, 1807, of being forced by the British vessel, the *Leopard*, to haul down its flag and to give up four of its crew as British deserters. On June 1, 1813, the *Chesapeake* sailed out of Boston Harbor to meet the British frigate *Shannon* which had challenged her. The two vessels were about equal in size and guns, but the crew of the *Shannon* were experienced and well trained men. Lawrence was courageous, skilful, and energetic, but overconfident. After a short fierce fight about 30 miles off Boston, the *Chesapeake's* stays were cut by shot and she lay helpless at the mercy of her enemy. Lawrence was defeated and received his death wounds. A few days later he died in Halifax, the port where his captured vessel was taken, and was buried there. Soon, however, the body of the young commander was returned to the United States government, and laid to rest with all the honors of war in the yard of Trinity Church, New York.

LAWRENCE, MASS. A yard of cotton goods as you buy it at the store is perhaps not very romantic, but if you should one day visit Lawrence, on the Merrimac River about 30 miles from the sea, you might forever afterwards see cotton cloth with different eyes. Here is one of the largest cotton mills in the world and connected with it is the largest print works. With 24 miles of looms, and 62 miles of whirling spinning frame bobbins, this factory makes 500 miles of cloth every working day.

Lawrence also leads the cities of the United States in the manufacture of woolen goods and one of its woolen mills is said to be the largest single mill in the world. The principal textile mill has nearly 10,000 employees. Another of its many important industries is the manufacture of paper, especially the kind known as "calendered book paper."

The water-power of the Merrimac, derived from a great dam begun in 1845, was the reason for the development of industry at this point. The town was incorporated in 1847 and named in honor of Abbott Lawrence, a member of a famous family of Massachusetts merchants and manufacturers, and a director of the company which built the dam. A structure of solid granite, 900 feet long and 30 feet high thrown across the rapids, this dam now furnishes about 15,000 horse-power.

Lawrence has suffered severely from labor disturbances, but with the help of better housing, naturalization, and recreation facilities the relation between workers and employers has improved. Seven out of eight of the inhabitants come from grandparents born under alien flags, more than 46 nationalities being represented in all. Population, about 95,000.

LEAD. The great weight and softness of lead and the ease with which it is extracted from its native ores have made it one of the "handiest" metals since very ancient times, and its great resistance to the action of most acids has given it a highly specialized place in modern chemical trades and industries.

Pure lead is used chiefly today for making water pipes, coverings for electric cables, chemical tanks, and storage batteries (*see* Storage Battery). Mixed with a small amount of arsenic, it is made into small shot and shrapnel bullets; with 25 per cent antimony it gives us type metal; with 50 per cent tin, we get solder. The principal lead compounds employed in the arts and manufactures are white lead (a form of lead carbonate), used for making paints; red lead or "minium" (one of the lead oxides), also used for making paint, particularly for ironwork; and litharge (lead monoxide), used in making flint glass and for glazing pottery. The so-called "lead" in pencils is not lead at all, but a form of carbon called graphite.

Before the invention of high-power explosives had compelled the use of tougher metals all rifle bullets were cast of lead. The small shot of olden days was made in high shot towers, from the top of which molten lead passing through a sieve fell in tiny drops,

which cooled on their downward journey and plunged into water tanks at the bottom.

Lead in its pure state is grayish-white in color. A fresh-cut surface will glitter brilliantly, but quickly becomes dull on exposure to the air. Because it lacks rigidity and tensile strength it is unfit to support any great strain, either pull or pressure. It melts at 327.4° C. (621° F.).

Lead is mined chiefly in the form of galena (lead sulphide), which is usually found associated with silver, and one-third of the world's supply comes from the United States. The city of Galena, Ill., gets its name from the large deposits of this ore in its neighborhood. Other important deposits are found in Missouri, Idaho, Utah, Arizona, Colorado, and Oklahoma. The process of extraction is simple, the ore being roasted until all the sulphur is burned away.

All the compounds of lead are poisonous. Special caution is required in occupations where quantities of this metal are used, such as glazing, painting, plumbing, and printing, for the lead poisons are of the kind called "cumulative," that is, they accumulate in the body, gradually producing graver symptoms, extending from colic to nerve paralysis, blindness, convulsions, and death. There is practically no danger from lead plumbing, where the water is hard, for a coating of insoluble salts is formed on the inside of the pipes, but with soft water poisonous soluble compounds are formed, and must be guarded against.

Lead was known to the Romans, who used it extensively for water pipes, tanks, weights, and rings. It is frequently mentioned in the Bible.

League of Nations. The ideal of European Unity is an old one, but its development into the League of Nations is very recent. The development of improved means of communication—railroads, steamships, telegraphs, wireless—all helped by knitting the world more closely together. Innumerable international meetings have been held—in a single year as many as 160—to consider special aspects of world problems; and since the organization of the International Postal Union, in 1874, an increasing number of permanent official international bureaus were organized with administrative and other powers. The Hague Tribunal, organized in 1899, was a long step toward an international organization by affording the nucleus for a world court of justice.

To President Wilson belongs the chief credit for making the formation of a League of Nations a reality. In his famous "Fourteen Points" (Jan. 8, 1918) he named this as part of the peace program, subsequently accepted by the Allies and by Germany in the armistice negotiations. "A general association of nations," read Point Fourteen, "must be formed under specific covenants, for the purpose of affording mutual guaranties of political independence and territorial integrity to great and small states alike." His insistence at the Peace Conference made the League covenant a part of the Versailles treaty. Many persons offered suggestions as to plan, the one most closely followed in the covenant being that of Gen. Jan C. Smuts of British South Africa.

The machinery of the League consists of an Assembly, an Executive Council, and an international Secretariat. The Assembly, which meets at stated intervals, is composed of not more than three representatives from each of the member countries, but each state has only one vote. The Executive Council consists of representatives from the United States (should it enter the League), Great Britain, France, Italy, Japan, and four other states chosen by the Assembly. The Executive Council selects the permanent general secretary for the League, who, with his staff, forms the Secretariat. New member states are admitted upon the consent of two-thirds of the Assembly, and must be self-governing countries, including dominions and colonies. Withdrawal from the League requires two years' notice and fulfilment of all obligations. With four exceptions, all votes in the Council and in the Assembly are required to be unanimous. Geneva is the seat of the League.

The Purposes of the League

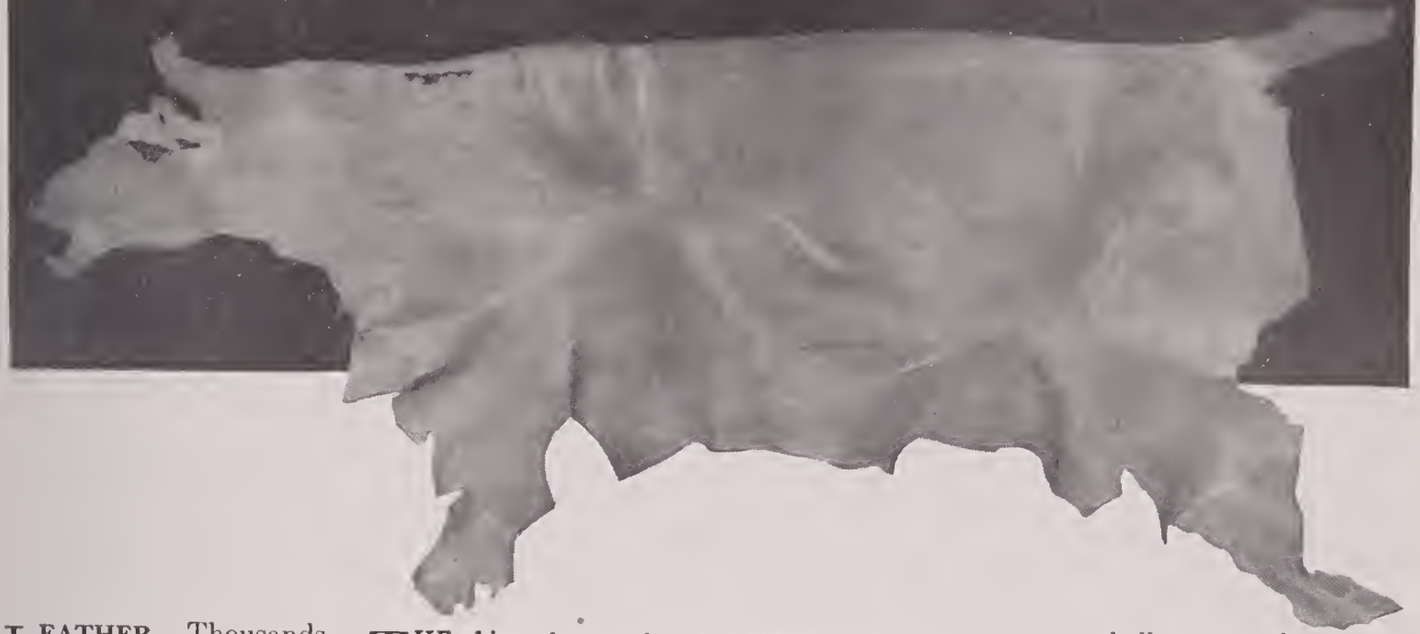
The purposes of the League are to prevent wars by insisting upon arbitration and judicial decision of disputes, to secure a reduction of national armaments, and prevent international traffic in arms, drugs, women and children; to obtain fair and humane conditions for labor, etc. All treaties entered into by member states must be registered with the Secretariat of the League. A system of "mandataries" responsible to the League is set up to rule the former German colonies and certain portions of the Turkish Empire and other backward regions. As a concession to the United States, "regional understandings like the Monroe Doctrine" are declared unaffected by the League covenant. Finally, in Article X, the members undertake "to respect and preserve as against external aggression the territorial integrity and existing political independence of all members of the League." The chief weapon to be used against offending states is an economic blockade.

Owing to widespread differences of opinion in the United States regarding the treaty of Versailles and the advisability of joining the League of Nations, the Senate refused to ratify the treaty, and the League became an issue in the political campaign of 1920. The result of the election was an overwhelming reverse for the Democratic party and a victory for those who opposed the League.

The League is Established

Nevertheless, the League had already come into existence, with the ratification of the treaty by France, Great Britain, and Italy. The first meeting of the Executive Council was held in Paris, Jan. 16, 1920. On Nov. 15, 1920, the full Assembly of the League met in Geneva for the first time with 41 countries represented. It was generally recognized, however, that without the participation of the United States the League could never fulfil the high hopes of its founders.

HOW HIDES *and* SKINS BECOME LEATHER



THE skins of more than 140,000,000 animals a year are converted into leather in the factories of the United States and from that leather more than a billion dollars' worth of manufactured articles are made. Think of the variety of uses to which leather is put—shoes, gloves, harness, belting, upholstery, bags, suitcases, bookbindings, coats, aprons, and a host of others—and you will realize why it is one of the three most important contributions from the animal world, food and wool being the other two.

LEATHER. Thousands of years ago men learned that the hides of animals could be saved from decay and made tough and pliable by smoking them, or soaking them in oil, or treating them with solutions of various astringent barks. At first the whole hide, fur and all, was prepared for wear as a garment; but it was soon learned that by removing the hair the rest of the hide could be made useful for many other purposes. Among ancient nations leather-dressing was one of the most important occupations, and a special quarter in many cities was set apart for the tanners — partly, no doubt, because of the disagreeable odor that accompanies the process.

The hides and skins of domestic animals are the great source of leather supply. The skins of the larger animals, as cattle and horses, are called hides. The hides of smaller animals, such as sheep, goats, hogs, dogs, etc., are known as "skins." The deer, kangaroo, buffalo, and such water animals as the alligator, walrus, seal (not the fur-bearing seal, but a distinct species), whale, and shark also furnish leather to a limited extent.

Before the hides are ready for use as leather they have to go through a good many processes. These processes are much the same today as they were in the days of the Egyptians, for modern ingenuity has not been able to hasten and improve the manufacture of leather to any such extent as it has done for most other manufactures. The first step is to remove the skin from the animal whole and without blemish. With modern tools this is done very skilfully and quickly; sometimes air is forced under the skin with a bellows to make removal easy. "Packer" hides are the skilfully skinned and preserved hides which come from the great meat-packing establishments; the less scientifically handled hides sold by farmers and local butchers are classed as "country" hides and bring a lower price. If the hides go at once into the tanning process they are left untreated or "green." If there is any delay they must be dried, or "green salted," that is, have salt rubbed into the flesh side to prevent decomposition.

At the tannery the skins and hides are trimmed to remove flesh and useless parts, and put into "soaks"—large tanks of brine. Here they are left for from two to four days to be plumpened, softened, and cleansed. The "fleshing" machine next removes all fat and tissue. The hair is loosened by a chemical bath and is scraped off by another machine.

After thorough washing and trimming the hides are ready for tanning. The purpose of tanning is to stop decomposition, to give the hides greater strength, toughness, and pliability, and to make them impervious to water. There is a choice of processes, upon which will depend the grade and special quality of the finished leather. The chief processes are the tanbark treatment, treatment with different oils or tallow, and the chrome or chemical process. When it is desired to tan skins without removing the fur or hair for use as furs or floor-mats, they are "tawed" or dry-tanned by packing in moist salt and powdered alum.

For the heavier leathers and some of the lighter kinds, the tanbark process is in most general use. Barks of many kinds of trees and other vegetable substances containing tannin are used, and the manner

of their use and the choice of barks largely determine the kind and quality of the leather. Most heavy leathers, such as sole and belting leather, upholstery, harness, bag, and strap leathers, are tanned with hemlock and oak. In Australia the mimosa or wattle-barks are much used. Tannin is also found in the bark and leaves of most forest trees, but only the willow, chestnut, and birch furnish enough to be of commercial value. Other tanning materials of importance are *quebracho*, a widely distributed tree of South America; *myrobalans*, the fruit of an Indian tree; *divi-divi*, the dried seed-pods of a South American tree; *gall-nuts*, abnormal growths found on oaks, caused by the gall wasp's laying eggs in the plant; *gambier*, the product of a shrub cultivated in Singapore and the Malay Archipelago; *mangrove*, from the mangrove trees of Borneo; *valonia*, the acorn cup of the Turkish and Greek oak; and *sumac*, the ground leaves of a plant grown in Mediterranean regions.

The skins are suspended in vats containing tanning solutions made of these ingredients, singly or in combination, and are removed from one vat to another, each succeeding vat containing a stronger solution than the one before. They are then dried by artificial heat, oiled, and ironed by large rollers.

Bark or vegetable tanning requires from 90 to 100 days, while the process of chrome or chemical tanning takes less than a third of that time. This process was invented by an American in 1884, and is now the most general mode of dressing light leathers. It is also used for heavy leathers where great strength is needed. The liquid used is a solution of chromium salts, obtained from chrome iron ore, which comes chiefly from New Caledonia.

Oil tanning is used for making soft glove leathers such as chamois, buckskin, and piano leather. The process, called *chamoising* ("shammying"), consists of working oil into the skins, to make them spongy and soft. Many of the soft leathers formerly treated in this way are now chrome-tanned.

HOW THE HAIR IS REMOVED FROM THE HIDES



One great advantage in visiting a tannery "by picture," as we are doing here, is that you escape the smells; for the smell of a tannery is something awful! This smell comes from the wet hides. When the hides are brought into the tannery they are soaked in water to get the salt and dirt out of them. Then they are put into a succession of vats each containing a stronger chemical solution than the one before. This loosens the hair so that most of it is easily removed by the "dehairing" machine. The hides are then turned over to the "beamsters" who lay them over beams such as you see on the right and scrape off the remaining hair with knives.

The finishing processes are varied according to the use for which the leather is intended. The leather as it drys after tanning is stiff and rough. Rubbing oil into the leather to make it soft and pliable is called "currying." Sometimes the currying and finishing is done as a separate industry, the currier buying the rough leather from the tanner. Dull leather, such as is used in the cheaper grades of shoes, may be simply oiled and worked to make it pliable. Harness leather and sole leather is put in great presses to make it hard and durable. If a luster is desired a dressing is applied to the grain side of the leather and then it is run through pressure rollers which polish the surface; if a dull polish is desired a revolving brush is passed over the surface. Grain leather may also be given a pattern, as is done in box calf or imitation alligator skins.

The coloring of leather is an art in itself, requiring great care to bring about a uniform result. Different skins going through the same color bath will be of different shades, and various portions of the same skin may take the color unevenly so that the leather may appear spotted.

The modern factory aims to eliminate all waste. The small pieces of leather chipped off in trimming the hides for market are combined with some of the substances used in the course of the tanning, and made into a pulp that will harden into any required shape or into boards to be cut into shoe heels and inner soles. The waste fat and tissues cut from the hides are used for glue, and the hair is sold for making cheap blankets and cloth, or used in the making of plaster.

Leathers are distinguished by many names according to their material and treatment. The most numerous and useful are made of cowhide and calfskin, which furnish more than 70 per cent of the total leather supply of the United States. *Box calf* is calf leather stamped with irregular lines forming rough rectangles. *Wax calf* is heavy calfskin with a wax finish. *Ooze* or *suede* calfskin (sometimes kid) is finished by "buffing" or grinding the face on an emery wheel. *Dull calf* or *gun-metal* has a smooth unglazed finish.

About 25 per cent of the leather supply is furnished by the skins of sheep and goats, which are used chiefly for shoe uppers and gloves. Kid or goatskin (all imported) is the usual material for women's and children's shoes. *Glazed kid* is the most common form, having a smooth highly polished surface. *Vici kid* is a proprietary name or trademark for a chrome-tanned glazed kid. *Undressed kid* is a skin dressed only on one side, used chiefly for gloves. Heavy plump goatskin, tanned by a combination vegetable and chemical process and having a semi-bright finish, is called *Dongola*. *Morocco* was originally a sumac-tanned goatskin, made in Morocco and stained red; the term is also applied to imitations of morocco, also to any heavy tanned goatskin.

Russia leather was originally a very high-grade calfskin made in Russia and dressed with birch oil, which gives it a peculiar fragrance; it was dyed a deep red. So-called Russia leather is now made throughout Europe and America of heavy skins of various kinds, and finished in tan, brown, or black. Red Russia is now chiefly used for binding fine books, as the leather is watertight and strong and repels insects. *Patent leathers* are made from any firm soft leather, free from grease and with no tendency to stretch. Successive coats of black varnish are applied, until the surface is covered with a heavy coat of enamel, and the last coat is baked on. *Cordovan* is horsehide, very durable and watertight; the name comes from the Spanish city Cordova, which had an ancient reputation for making fine shoes. Imitations are now made from calf. *Chamois* is properly the dressed skin of the Alpine chamois, but the genuine article is very scarce; most so-called chamois is chrome-tanned sheepskin. *Buckskin*, which originally was tanned deerskin, is now usually suede-finished calfskin or kid. It is a buff or cream-colored leather, almost as soft and pliable as cloth, and is widely used in glove-making.

Because of the increasing demand for leather and its consequent rise in price, various substitutes have been devised, some of which closely resemble leather in feeling and appearance, though not in durability. They are prepared from strong fabrics treated with collodion-cotton and dyed and embossed to resemble leather (*see* Cellulose). Such substitutes are now extensively used for upholstering automobiles and furniture, and for making bags, suitcases, and similar articles. "Split" leather is an inferior kind consisting of the weak fleshy portion of the hide, split away from the hide before tanning. This is coated with soluble cotton and embossed, and sold as "real" leather, but it is only about half as strong as the best sorts of imitation leather.

HOW THE "JACKING" MACHINE WORKS



You might well wonder why they do not call them "ironing" machines, for their business is to iron out the leather so it will lie nice and flat under the knives of the splitting machines.

FIRST STEPS IN LEATHER MAKING



When the "raw" hides reach the factory, the hanging parts such as the ears and tails are trimmed off, and all clinging bits of flesh are carefully removed. Then the hides are put into lime vats, like the one shown here. The lime loosens the hair. The workmen who handle the hides from the lime vats must wear rubber gloves to keep the liquid from eating into their skin.

"PADDLING" THE RAW HIDES



After the skins have soaked in lime for a while, they are put into vats like this to be washed clean. The paddle wheels revolve, carrying the hides around with them and, the water being constantly renewed, the lime is gradually removed. If it were left on the hides, it would not only loosen the hair, but would affect the skin as well.

FEEDING HIDES TO THE SPLITTING MACHINE



Here we see a workman putting a hide into the splitting machine. This machine is delicately adjusted to shave the hide into two sheets. The hair half is called "grain" leather, and the flesh half is called "split" leather. The grain leather has the firm tough fiber that made up the outside of the animal's skin, and is therefore of higher grade than the split.

AT THE END OF THE PROCESS—OILING AND DRYING



After the hides have been tanned, they are colored, seasoned, and oiled. Here we see two workmen applying the oil with soft cloths. The right hand picture shows the men hanging up the hides to dry. Once dry, the finished leather is sorted according to weight. The heaviest and strongest skins are collected and classed as "first grade," and the others graded accordingly. Since leather is sold by the square foot, each hide is measured in a measuring machine and its size marked upon it. Then they are put into big bundles for shipping.

contained in the Easy Reference Fact-Index at the end of this work

ALL ABOUT LEAVES *and* THEIR USES *to* PLANTS

They Serve as Mouths, Stomachs, Pores, and Lungs and in Helping Themselves They Help Us, for They are the Original Source of Nearly All Our Food, Even Such Things as Bacon and Eggs

LEAVES. Most people look upon leaves merely as the brilliant costume of the trees without realizing their immense importance to human as well as to plant life. It may be surprising to learn that by far the largest part of the food you eat is manufactured originally by the leaves of plants, even your breakfast bacon and eggs if you follow them back far enough. Indeed, we shall see that leaves are the mouths, the lungs, the stomachs, the pores, and the "eyes" of the plant, without which the plant could not live and grow.



Trees with thick foliage, like the horse-chestnut shown here, almost always have leaves of the "split" variety—that is, each leaf is split up into several parts so that the sunlight can pass between them and reach the leaves beneath.

We can learn all the more important facts about leaves by examining any ordinary leaf from a tree or bush. From the stem a network of veins branches out to all parts of the leaf. Those veins act not only as the fiber skeleton which holds the leaf spread out in shape, but as the "blood-vessels" which connect every portion of the leaf with the deepest rootlet far away underground. In between the veins, the leaf is filled with a spongy mass of green-colored cells, held in place by a thin skin or membrane on the upper and lower surfaces.

HOW LEAVES EAT AND BREATHE



This is the epidermis of a leaf highly magnified, showing the eating and breathing pores open. These stomata, as they are called, not only serve as mouths, but as pores through which the leaf sweats and so keeps cool in spite of the heat of the sun.

Now let us follow the leaf through a day's work as it hangs upon the tree. First, we will find that the upper surface nearly always faces toward the sunlit sky. If a tree is growing close against a high wall, very few leaves will be found on the dark side. That is because the leaf needs sunlight to do its work. There are a few interesting exceptions to this rule, however, such as the compass plant, whose leaves are turned on edge pointing north and south, to avoid the too intense heat of the sun in the dry hot regions where it grows (*see* Compass Plants; Eucalyptus).

As the sunlight strikes through the smooth transparent membrane on the upper surface of the leaf, small quantities of air enter through thousands of tiny "mouths" (stomata), mostly on the under side. At once a strange thing takes place. The green coloring matter (chlorophyll) of the leaf takes from the air a substance called carbon dioxide, and mixes it up with the water from the distant roots. Then, with the aid of the sunlight, the leaf manufactures out of this mixture the sugars and starches which are the basis of plant food, and turns out into the air again through those same "mouths" the surplus oxygen. The sugars and starches then pass back through the veins and stem of the leaf, and unite with other chemicals in the sap to nourish the plant and build up the hard woody material (cellulose) of the stem and branches (*see* Cellulose).

But the leaf performs another important function. When they are not drawing in air to help make food, the "mouths" turn into "pores" and perspire away the excess water sent up from the roots. This helps to keep the leaf cool and healthy, in spite of the burning rays of the sun.

In a sense the leaf "sees" the light, for the leaves of a plant growing in a cellar will keep turning toward the windows, no matter how often the position of the plant is changed. There are, in fact, what corre-

spond to eyes on the upper surface of a leaf—that is, tiny cells covered with curved transparent membranes like the lenses in a telescope or camera. It has been shown that if a film of water covers the upper surface of certain leaves, so as to destroy the focusing effect of these tiny leaf-lenses, they appear to be no longer able to determine the direction of the light. The leaves of some plants are sensitive to touch as well as light (*see* Sensitive Plants).

Plants show a wide range of leaf shapes, each suited to particular needs. But they may all be divided into three classes according to the arrangement of the main ribs of their skeleton: (1) those with several main ribs branching out finger-like from the stem, called "palmate" (from the Latin meaning "palm of the hand"); (2) those with a single large middle rib from which smaller ribs branch out feather-like on each side, called "pinnate" (from the Latin meaning "feather"); and (3) those in which the ribs do not form a branching network at all, but run straight from the stem to the pit, called "parallel veined."

The great differences in the outlines or outer shapes of leaves are mainly due to the extent to which one or the other of these three types of skeleton frame-works are filled in with the green cell-tissue. For instance, the round nasturtium leaf, the slightly indented leaf of the scarlet geranium, the ivy leaf with its sharp lobes, and the leaf of the horse-chestnut, which is split into sections clear down to the stem—these are all of the palmate type, with different quantities of flesh on their bones, so to speak. Similarly the beech leaf, the oak leaf and even the locust leaf, which consists of groups of pairs of small leaflets arranged around the main stalk, are all examples of the pinnate type. Lilies, tulips, and almost all grasses illustrate the third or parallel-veined type of leaves.

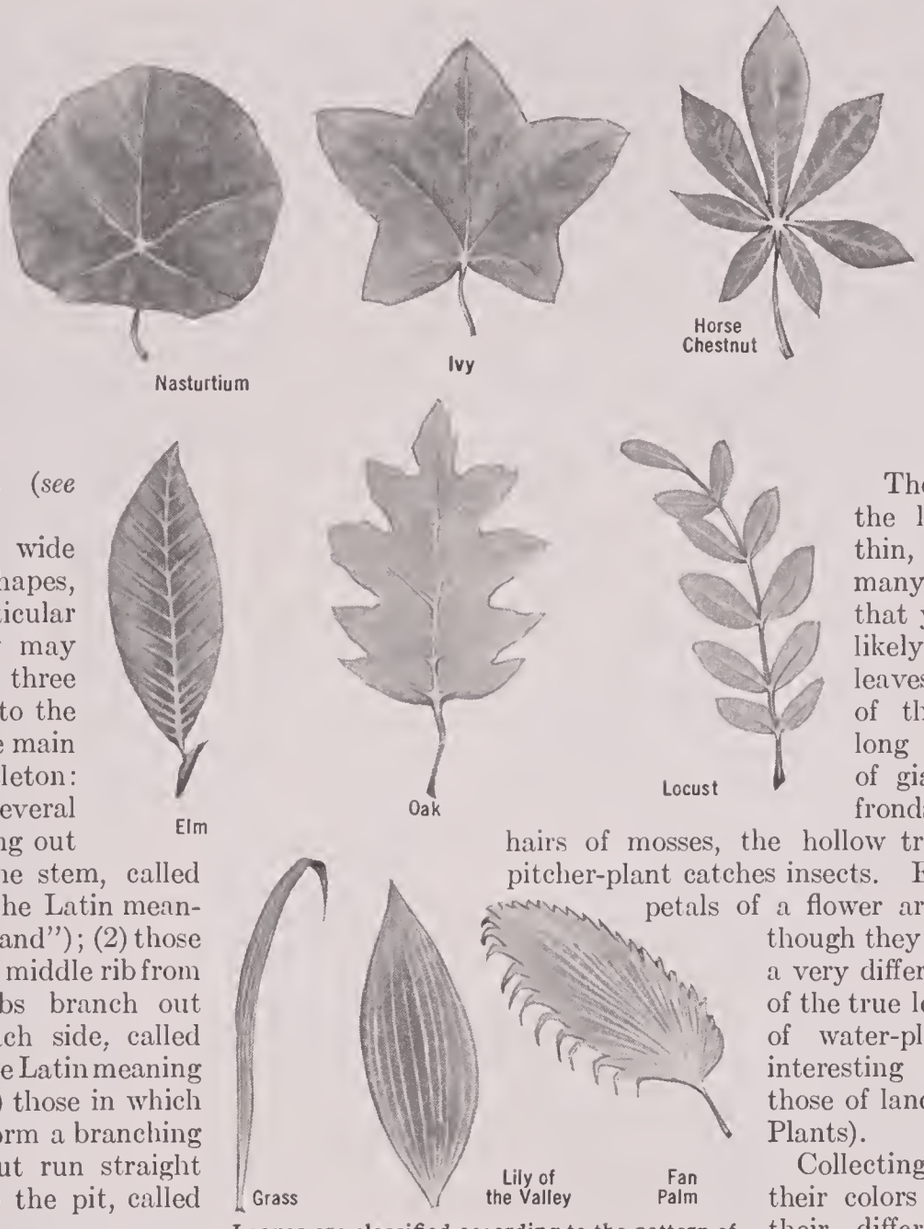
Leaves are arranged in such a way as to get the greatest possible amount of light; they may be in pairs (opposite), or in spirals or zigzags about the branch (alternate), but no leaf will ever closely overlap another.

The normal form of the leaf is broad and thin, but there are many modified leaves that you would not be likely to think of as leaves at all—the needles of the pine tree, the long ribbon streamers of giant seaweeds, the fronds of ferns, the tiny hairs of mosses, the hollow traps in which the pitcher-plant catches insects. Even the sepals and petals of a flower are modified leaves, though they have come to play a very different role from that of the true leaves. The leaves of water-plants show many interesting differences from those of land plants (*see* Water Plants).

Collecting leaves, either for their colors in the fall, or for their different forms, is a fascinating pastime. They can be easily pressed out flat, labeled in ink, right on the leaf itself, and mounted in a blank book. Just try beginning a collection this summer, and see how soon you will know every tree and shrub in your part of the country.

In the autumn the leaves of deciduous trees deck themselves in gorgeous crimsons, purples, browns, and golds. These remarkable displays of color are the result of life changes taking place in the trees themselves. The tree is thrifty and a good manager, and when it feels the approach of autumn,

HOW NATURE PLAYS WITH LEAVES



Leaves are classified according to the pattern of their "veins." Each of the rows here contains leaves of the same class, although the outlines differ radically. Those in the top row, for instance, are characterized by veins branching from a common center. They are called "palmate" from the resemblance of this pattern to the palm of the hand with its branching fingers. The Nasturtium leaf, as you see, has an almost unbroken round outline, the Ivy is cut into star-shape, while the Horse-Chestnut is cleft between the veins all the way down to the stem. The leaves in the middle row are of the "pinnate" variety so called because of the resemblance of their vein pattern to a feather (Latin, *penna*). Notice that the veins in each of them branch out from a middle rib. In the case of the Locust the cleft between the ribs is carried to the extent of making each leaflet look like a separate leaf. At the bottom we have leaves of the "parallel-veined" type, in which each vein starting at the base, runs to the tip without network or branching.

it not only puts on a thicker coat of bark over its twigs, but it begins to get ready to part with its leaves at the least cost to itself.

The first step is to withdraw to a place of safekeeping the precious chlorophyll. This magic substance wears two coats, one green and one yellow, and all summer the green hides the yellow one. But in the process of being drawn back into the tree, the green cloak goes first, leaving the yellow behind to give the beautiful yellow color to the leaves.

Also, while the chlorophyll is manufacturing food for the tree, it incidentally manufactures "glucoside" and other by-products which probably the tree has no use for. When autumn comes the tree grows a corky layer between the twig and the base of the leaf stem, so there will be no wound when the leaf falls. This cork door shuts up the glucoside and other substances in the leaf, where they oxidize; and it is this which makes the rich reds and browns of the autumn foliage. (*See also* Plant Life; Tree.)

Most leaves consist of two distinct parts: the *petiole* or stalk attached to the stem, and the thin expanded portion called the *blade*. Sometimes there is no petiole and the blade is attached directly to the stem. Many leaves grow from between a pair of small appendages called *stipules* attached either to the base of the petiole or to the stem. Some stipules remain attached during the life of the leaf, as in the apple. In the grasses the lower part of the leaf folds around the stem for some distance and is called the *sheath*.

If the leaf consists of a single blade it is called *simple*. If it is divided into two or more divisions set off from each other like distinct leaves (called *leaflets*) the leaf is *compound*. The green pulpy substance of a leaf is called the *parenchyma;* the outer layer of cells is the *epidermis*.

LEE, RICHARD HENRY (1732–1794). On June 7, 1776, Richard Henry Lee moved in Congress the resolution "that these colonies are, and of right ought to be, free and independent states." On this resolution his fame chiefly rests, though it was by no means his only service during the Revolutionary War.

In the 10 years of agitation preceding the Revolution, Lee opposed the arbitrary measures of the British ministry. To him belongs primarily the credit of suggesting in 1768 committees of correspondence to secure unity of action among the colonists. This suggestion was acted on in 1772, and the committees formed then were the first attempt at concerted action, and paved the way for the Continental congresses of 1774 and 1775, of which he was an influential member.

In 1776, acting upon instructions which he had received, he introduced into Congress the famous resolution quoted above. A short time later he was called home by the illness of his wife, and so did not serve on the committee which drafted the Declaration of Independence. He served as president of the Continental Congress under the Articles of Confederation from 1784 to 1786.

In 1787, Lee was so opposed to the idea of a new Constitution that he declined an appointment to the Constitutional Convention. When the Constitution was submitted to the people for adoption, he and Patrick Henry were its most violent and tireless opponents, because they feared it would deprive the states of their rights and that it might become an instrument of tyranny. Lee's pamphlets opposing its ratification, entitled, 'Letters of the Federal Farmer', had a wider circulation than any of the other pamphlets either for or against the new form of government.

He became reconciled to the Constitution, however, after it was put into operation, and in 1789 accepted the position of one of Virginia's first senators under the new form of government. Ill-health forced him to retire to private life in 1792.

The MILITARY GENIUS AND HERO *of the* SOUTHERN CONFEDERACY

The Story of a Man Who Gave the Services of His Brilliant Mind to a Lost Cause and Offered Up All Worldly Advantages on the Altar of His Sense of Duty

LEE, GEN. ROBERT E. (1807–1870). "Marse Robert," as the great military leader of the Confederacy was affectionately called by the people of the South, died a few years after the close of the Civil War. He knew the day would come when Blue and Gray would clasp hands above all those graves. Could he have lived until the centenary of his own birth, Jan. 19, 1907, he would have heard his eulogy pronounced by a Massachusetts Adams. He would have seen all parties and a national press united to do honor, not only to his genius as one of America's greatest soldiers, but also to the nobility of his character.

Robert Edward Lee was born at Stratford, Westmoreland County, Va., but the family soon removed to Alexandria on the Potomac near Washington. His father was "Light-Horse Harry" Lee, of Revolutionary fame, and his grandfather was first cousin to Richard Henry Lee, mover of the Declaration of Independence. Patriotism was a tradition of the family. So it was natural that Robert should be educated for the army. He was graduated from West Point in 1829, the second in rank in his class, without having received a single demerit. He was assigned to the engineering branch of the service.

At 25 he married Mary Custis, great-granddaughter of Martha Washington and heiress of the beautiful estate of Arlington, on the Potomac opposite Washington City. Fortune seemed to have marked him for its own. To birth, wealth, a cultivated mind, courtly manners, a fine physique and handsome face, were added personal happiness and eminence in his profession. As assistant chief engineer of the army in the Mexican War he won distinction; as superintendent of West Point in the 50's he introduced the best methods known in Europe. On the eve of the Civil War he had only the rank of a colonel, but



GENERAL ROBERT E. LEE

General Winfield Scott, head of the national forces, was too old to take the field, and he looked upon Lee as his most probable successor.

In 1852, in entering his own son at West Point, Lee said to him: "Duty is the sublimest word in the language; you cannot do more than your duty; you should never wish to do less." In April 1861, the question of duty confronted Lee himself, when President Lincoln definitely offered him the command of the United States forces.

From the very beginning of the United States government the question of the rival claims of the states and the Union was a matter of debate. The South had generally advocated the principle of state sovereignty. Lee had already written, "I cannot anticipate a greater calamity for the country than the dissolution of the Union." But he was a Southerner, and he felt that his first duty was to Virginia. In the same crisis Admiral Farragut decided for the Federal government. In remembering Lee's decision, it must be remembered that his interests lay with the government; and there is reason to believe that he knew even then that the Union must triumph, so that he consciously led a "lost cause" from the beginning. Beautiful Arlington, his wife's birthplace, his own home for 30 years, and his children's ancestral inheritance, was lost immediately. It lay on the natural line of defense of the capital and became the first camping ground of the Northern army. His fortune was lost when he resigned his commission and offered his services to the South. He was made one of the five full generals in the Confederate service. In the spring of 1862 he was placed in command of the armies operating in defense of Richmond. The masterly strategy which Lee displayed in the "Seven Days' Battles" showed him to be a commander of the highest ability. The same may be said of his movements in opposition to General Pope a few weeks later. Lee's success against McClellan and Pope emboldened him to attempt an invasion of Maryland in the fall of 1862. This campaign was terminated by the indecisive battle of Antietam, fought on the 16th and 17th of September. In December he decisively defeated General Burnside at Fredericksburg and the next May he defeated and drove back General Hooker in the battle of Chancellorsville.

The Last Stand for the Lost Cause

Lee then gathered together all his available forces and again moved northward, his campaign ending with the battle of Gettysburg, which took place on the first three days of July 1863. On the first two days of this battle the advantage seemed to rest with Lee's army, but on the third day he staked the issue in a grand charge, which was completely repulsed, and he was compelled to retreat. He succeeded, however, in recrossing the Potomac, and was again safe in Virginia.

No operations of importance were undertaken by either army during the winter of 1863–64; but early in May 1864 General Grant was called to Washington, and took the field against Lee's army in person. Grant attempted to turn Lee's right flank by a march through the densely wooded region known as the Wilderness. Here occurred two days' bloody but indecisive fighting, after which Grant again sought to turn Lee's flank by marching to Spottsylvania Court House. At this place on the 12th of May there was another bloody and indecisive engagement. The two commanders continued to maneuver for some weeks without coming to a general engagement and without any result, save that Lee was gradually forced back toward Richmond.

In the spring of 1865 General Lee was compelled to abandon both Petersburg and Richmond. He was still hotly pursued by Grant, and a few days later at Appomattox Court House his entire force surrendered, and the war came to an end. Lee might have prolonged the struggle indefinitely by breaking up his army into guerrilla bands and scattering them among the mountains, but this he refused to do. There are few instances of greater nobility than that with which he accepted defeat, and set himself to helping to make his country once more a union of loyal states.

Although impoverished by the war, and face to face with old age, he refused wealth and places of honor in service abroad to accept the presidency of Washington College, later renamed Washington and Lee University, at Lexington, Va. Its doors had been closed for four years. The building up of this institution was General Lee's part in the work of reconstruction, and he let no opportunity pass to aid in the restoration of peace and harmony, though the day of final reconciliation must still have seemed far away when he died, on Oct. 12, 1870.

LEECH. The leeches are blood-suckers which belong to the worm family, and they have soft flat bodies divided into segments. At each end is a rounded sucker, a large one at the tail end, and a smaller one where the mouth is. Most leeches live in the water, where they attach themselves to fishes, turtles, and frogs, and even to persons who go in swimming in ponds and brooks and to cattle which come down to drink. They fasten themselves with their hind sucker, and then with the mouth sucker they suck up the blood through three little holes which they make in the skin with their sharp triangular teeth. Leeches swim well, curving their bodies like eels and moving with the pointed tail end foremost.

A few leeches live on land. These are found chiefly in the damp forests of Asia and are terrible pests.

The stomach of a leech extends throughout almost the entire length of the body and has numerous little sacs along its sides. These greatly increase its capacity, so that the leech can swell out its body with the blood it has sucked almost as if it were made of rubber and one meal may last for several months.

Leeches were formerly used a great deal by physicians for drawing off or "letting" blood from feverish patients, but they are little used today.

Along the body the leech has rows of little sense organs, which look like pimples. These are very sen-

sitive and tell the leech the temperature of the water and the presence of food or enemies. Near the head these sense organs become modified into eyes.

There are two common species of leeches which every boy will run across in ponds and brooks. The *horse leech* is jet black, but in the bright sun it may have a brownish tinge. It grows sometimes to the length of six or eight inches. The *medicinal leech* is very pretty, being cross-barred with various shades of brown and black. This kind is most often found in clear running streams attached to the under side of stones. Turtles often have a number of leeches attached to the under side of their shells or under their hind legs. Scientific name of medicinal leech, *Hirudo medicinalis*; of horse leech, *Aulastoma gulo*.

Leeds, England. For centuries England has been noted for the quality of its woolen cloths, the manufacture of which centers in Leeds, the sixth largest city in England, and the second largest in the great industrial county of Yorkshire.

Leeds is not very interesting to the tourist and is rather grimy from the factory smoke, but it has been important in English trade ever since woolen manufacture was introduced in the 14th century. It owes its commercial supremacy to two chief factors: its splendid transportation facilities and its situation on the edge of the great Yorkshire coal fields. The river Aire connects it with the east coast, and the Leeds and Liverpool canal provides cheap transportation to the west coast. The iron manufactures are nearly as important as the woolen. In the manufacture of boots and shoes, felt, ready-made clothing, artificial silk, glass, and pottery, Leeds also ranks high. Linen making from flax grown in the Yorkshire region is another important industry.

A suggestion of the interesting history of Leeds, which goes back for 13 centuries, is perpetuated in the celebrated ruins of Kirkstall Abbey—a Cistercian foundation of the 12th century—which now stand in the midst of a factory district. Leeds is also noted for its fine university and for the great music festival which is held there every three years. Population, about 450,000.

Leipzig (*līp'sĭk*), Germany. In Europe's many wars certain areas have been immemorial battlefields —the plains of northern Italy, the fields of Flanders, and the spot where the roads from western Germany and the central Rhine break through the Thuringian Forest to the plains of Saxony. One may take his stand there and review in memory the armies and campaigners of Gustavus Adolphus, of Frederick the Great, of Blucher and Napoleon. In this strategic spot, strategic for commerce and industry and culture as well as for battles, stands the city of Leipzig, the third largest city of Germany, itself the scene of Napoleon's decisive defeat in 1813, and of that "battle" of wits in 1519 when Luther debated his new views with John Eck.

Leipzig is above everything else today the chief German center for the publishing and selling of books. There are about 1,000 establishments engaged in this business. A great book museum here is a Mecca for those who wish to know about books and their history. The three great commercial fairs or *Messe* each year are the most remarkable survivals of what once was a common commercial arrangement in the Middle Ages.

The university, with its large student body, library, and faculty, is one of the oldest and most important in Germany. Leipzig is also a musical center, and in the past Bach and Schumann dwelt here.

The German Supreme Court sits in Leipzig. The many monuments, imposing public buildings, and large railway station and a population of about 605,000 give evidence of Leipzig's importance, but the city lies in a flat uninteresting country on a little river, the Elster. It lacks the charm of Dresden, the capital of Saxony, whose great art galleries, majestic Elbe River, and nearness to the mountains of Saxon Switzerland make it the Florence of Germany.

Lemon. The demand for lemons increases by leaps and bounds as the mercury rises, for in the long hot days of summer nothing is more refreshing than a glass of sparkling lemonade, with ice tinkling in its cooling depths. In Italy, Sicily, Corsica, and other parts of southern Europe, particularly in Spain and Portugal, lemon culture has been a large commercial industry for many years. European markets still look to these districts for their lemons, but the United States imports fewer every year because of the increase in lemon cultivation in California. The lemon industry in Florida until the cold wave of 1894 was of considerable importance, but since that time the great development of lemon culture has been in the irrigated lands of southern and central California, where lemons of superior quality are grown in ever increasing quantities.

The lemon is a close relative of the orange and has followed it all over the world. The straggling branches of the lemon tree, however, are very unlike the compact dense foliage of the orange, and the purplish flowers have not the agreeable fragrance of the white orange blossoms. The lemon is much less hardy than the orange and the area of cultivation is more restricted. It is cultivated and propagated in much the same manner as is its close relative the orange (*see* Orange).

If lemons ripen on the trees they lose their keeping quality, and so they are picked green before there is any sign of the golden yellow coloring. Each picker has a little ring 2¼ inches in diameter, and the fruit is cut when it can just slip through the ring. From the moment the lemons are harvested they must be "handled as carefully as eggs." In dark storehouses, well ventilated but free of drafts, they are carefully spread out and slowly ripened. In curing, the fruit shrinks a little, the skin becomes thinner and tougher and develops a silky finish. When the process is completed the lemons are washed, dried, and wrapped in tissue paper. In this condition they will keep for

months, which is a very good thing for the growers, as most of the fruit ripens in the winter and the great market demand is in the summer.

The lemon is used in more different ways than any other of the citrus fruits. From the rind, lemon oil or extract, used in flavoring and perfumery-making, is obtained either by expression or distillation, and candied lemon peel is made. The pulp yields citrate of lime, citric acid, and lemon juice. Besides its use in flavoring foods and drinks of various kinds, lemon juice is much used by calico printers to produce greater clearness in the white parts of patterns dyed with dyes containing iron.

Scientific name, *Citrus limonia*. Fruit probably introduced into Europe from Asia about the same time as the sweet orange. The tree flowers continuously and the trees contain flowers and fruits in all stages of development most of the year. Like the apple and orange, it varies exceedingly under cultivation. The lemon tree is exceedingly fruitful, some of the large old trees of Spain and Sicily ripening as many as 3,000 fruits in a favorable year.

LEMURS. Small monkey-like animals, the size of cats and squirrels, with big eyes, foxlike faces, and doglike nostrils—such are the lemurs. The name comes from the Latin *lemures*, meaning "ghosts," and is given them because of their nocturnal habits, their shy silent ghostlike movements, and their love of forests and darkness.

Lemurs are the lowest of the primates, the group which also includes monkeys, apes, and man. Most of them have tails, but they cannot hang from trees by them as some monkeys can.

With their numerous relatives, lemurs form the family called *lemuroids*. Of the 90 or so species of lemuroids, 50 or more are in Madagascar. All are restricted to the southern regions of the Old World—Africa, India, Ceylon, the Philippines, etc.—but only in the islands of Madagascar and Comoros are the true lemurs found. Interesting forms with local names include the beautiful but noisy ring-tailed lemur, whose bushy tail is marked with alternate rings of black and white; the large *indri* or babakoto ("little old man") of Madagascar; the dark iron-gray *gentle lemurs* which frequent the bamboo jungles; and the "aye-aye" of Madagascar, so named from its cry. Fossil remains of lemuroids are found in many lands, including North America. Lemuroids in general eat leaves, fruits, insects, small reptiles, birds, and birds' eggs. (*See* Monkey.)

LENIN, NIKOLAI (1870–). When the Red Terror of the Bolsheviki was raging in Russia in 1917–18, a short stockily built man, bald-headed, with steel-gray eyes peering beneath the broad brow of a scholar, sat within the Kremlin at Moscow directing the activities of the Soviet government, of which he was the head. It was Lenin, whose real name is Vladimir Ilyich Ulianof. Although the son of a councilor of state, he had been a revolutionist since his youth. When he was 17 years old his brother was hanged for plotting to kill the czar, and when he was 26 he himself fell into the hands of the imperial government and was exiled to Siberia. Following the expiration of this sentence, being forbidden to reside in any of the large cities of Russia, he lived in Munich, Brussels, Paris, London, and Geneva. He became widely known through his authorship of several scholarly but radical works on economic topics. After 1903 he was the recognized leader of the wing of Russian socialists who called themselves Bolsheviki.

When the government of the czar was overthrown in 1917, he returned to Russia, and replaced the mild socialist government of Kerensky with one of extreme radicalism. He did this with German aid and money. A high officer of the German staff after the war acknowledged "the valuable service Trotzky and Lenin gave us," and declared that the German government had sent Lenin to Russia from the Swiss frontier and that "with our consent Lenin and his friends disorganized the Russian army." Lenin favored immediate peace with Germany, to prepare the way for a world revolution directed against all capitalist and imperialist governments. Nothing else mattered. He called upon the working class to rise up and seize control of the land and industries, and establish the "dictatorship of the proletariat." The result was the Russian Soviet Republic, with himself as premier and Leon Trotzky as minister of war.

Possessed of one idea to the point of fanaticism, Lenin showed himself a man of relentless determination and iron courage, free from all personal self-seeking. He furnished the brains of the Soviet rule, as Trotzky furnished the fiery spirit and military organization. Lenin's numerous writings show him to be a man of learning with a remarkable grasp of the theories of revolutionary socialism. Although a follower of Marxian Socialism, the means he used are contrary to the teaching of Marx.

LENS. If you take the lens of an ordinary magnifying glass and hold it to the sun in such a way that the rays of sunlight passing through the lens form a tiny bright spot on a piece of wood or paper, the wood or paper will start at once to smoke and smolder and, if the lens be held in position long enough, flames will burst forth. In the "burning glass" experiment all the rays of sunlight which pass through the lens are bent and concentrated upon a single point, called the *focus*. Each ray carries with it, so to speak, a definite quantity of heat, and when all this heat is centered in one place, it is enough to start a blaze. (Fig. 1.)

But it is not as "burning glasses" that lenses are chiefly useful. Their power to bend and focus rays is used principally in telescopes, microscopes, spectacles, and cameras, to focus the light rays rather than heat rays.

Most of these principles of the lens can be demonstrated with an ordinary magnifying glass. Hold it close to some small object and the object will appear much larger than it is. Hold it at arm's length and look through it at some distant object and the object will appear upside down and much smaller. Go into a dark corner of a room and let the light from the window shine through the lens upon a piece of paper.

By moving the lens backward and forward, you will soon be able to cast upon the paper an inverted image of the brightly-lighted window and the scene outside.

The accompanying diagrams explain these differences in the action of a lens. We must remember that even after a ray of light has been bent out of its course, it still *appears* straight when it falls upon the eye. In Fig. 2 we see the effect of plain magnification. The rays from the object coming together at the eye seem to the eye to have come from an imaginary and much larger object.



Fig. 1—The Lens as a Burning Glass

The manner in which the inverted image is formed on the white paper is a little more complicated. In Fig. 2 we assumed that all the rays of light from the object were parallel to each other. In fact, of course, light rays spread out in every direction from any lighted point, as shown in Fig. 3. From the points *A* and *B* parallel rays pass through the lens and are bent so they cross each other at *C*. But other rays from *A* and *B* pass through what is called the *optical center* of the lens at *F*. These are not bent, but pass straight onward, and meet the first two rays at *D* and *E*. It is at this meeting place or "focus" that



Fig. 2—Magnification with a Lens

the image of the object *AB* is made on the paper, only that it is now upside down. Of course, rays from every other part of *AB* do the same thing and form a corresponding part of the image *DE*. The plane on which the different points of the image come to focus is called the *focal plane*, and it is in this plane that photographic plates are mounted.

The magnifying lens we have been considering is only one of many forms. Its two sides are sections of equal spheres, and such a lens, which is always thickest in the middle, is known as a double-convex lens. Other lenses may have both sides concave and thus be thickest at the edges; or one side of the lens may be flat and the other concave or convex.

In general the concave lenses, instead of converging the rays of light to a point, spread them out or diverge them in just the opposite way. For this reason objects seen through a double-concave lens appear right side up and smaller than they really are. By varying the curvature of the surfaces of lenses differences in focal length are obtained; that is, differences in the distance between the optical center and the focus. They may be ground also to throw distorted images, as in the case of spectacle lenses which are adjusted to combine properly with the lenses of the eyes. If the shape of the eye lens is distorted by

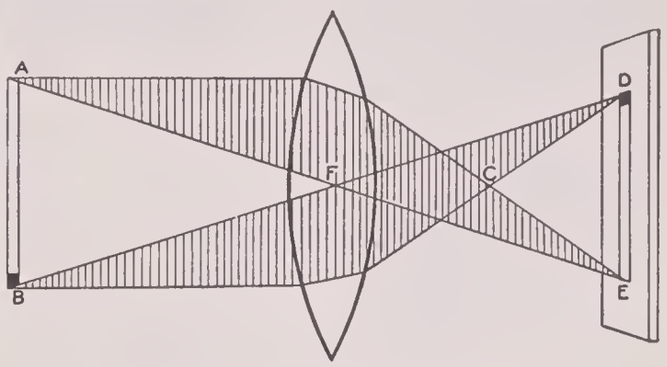


Fig. 3—Forming an Inverted Image

what is called "astigmatism," the spectacle lens is distorted in the opposite manner and the combination of the opposed distortions produce a normal image on the retina (*see* Spectacles).

The general optical law which governs the use of lenses is called the law of the refraction of light, and it may be summed up as follows: When a ray of light passing through a lighter medium (air) strikes the surface of a denser medium (glass) at an oblique angle, the ray is bent or refracted *toward* the perpendicular to that surface, and when it passes out again from the denser glass to the lighter air, it is bent *away* from the perpendicular to the second surface (*see* Light). The diagrams illustrate this law clearly.

Lenses are combined in optical instruments for various purposes. For instance, the enlarged image produced by one magnifying glass may be passed through a second lens and enlarged again, giving us the principle of the microscope (*see* Microscope).

For accurate work lenses are usually made of two or more layers of different kinds of glass closely cemented together. This is done to correct color aberration or the tendency that any special kind

of glass may have to separate the light rays into colors and so form an imperfect image, one surrounded with color. Crown glass, for instance, is used with flint glass, and each corrects the aberration of the other.

The manufacture of high-grade lenses is one of the most delicate of all mechanical operations. The curvature of the surfaces must be mathematically perfect, and they must have an extremely high polish to

LENS ACTION OF THE EYE



The retina lies in the focal plane of the adjustable crystalline lens and receives an inverted image.

prevent any stray light ray from wandering out of its proper course. The difficulties increase as the lenses grow larger, and the immense glasses used in big telescopes require months and even years of labor and experiment in their preparation. A tiny air bubble in the glass or the stroke of a workman's gritty finger over the surface may spoil everything. The surface of a lens is shaped by grinding the glass in an iron mold. Finer and finer grinding materials such as powdered emery or carborundum are used in succession, ending up with a red iron peroxide called "rouge," which gives the lens its high polish. (*See also* Camera; Photography; Telescope.)

Lentil. This food plant, akin to the bean and pea, is said to be one of the oldest cultivated by man, and it still is an important article of food in Egypt, Syria, Mexico, etc. The seeds, which are round and flat and under a half-inch in diameter, are made into soup or eaten boiled. The "pottage" for which Esau sold his birthright is said to have been made of these legumes. The vines make excellent fodder for cattle and sheep. Most of the lentils consumed in the United States come from Mediterranean countries.

Leo, Popes. The first of the 13 popes of this name is well called Leo the Great (Pope, 440–461) because of his learning and the important part which he played in the theological controversies of the time. (For the story of how he turned back from Rome the fierce king of the Huns, Attila, *see* Church, Christian.) Leo III (Pope, 795–816) is chiefly remembered because it was he who placed the imperial crown on the head of Charlemagne, on that memorable Christmas day of the year 800 (*see* Charlemagne). Leo IV (Pope, 847–855) did much to repair the damages done to Rome by the Saracens, and extended the walls of the city to include the Vatican quarter, on the right bank of the Tiber. Leo IX (Pope, 1049–1054) was a German, renowned because of his zeal in spreading the reforms of the monks of Cluny. He became pope through the influence of Emperor Henry III, and brought with him to Rome a young monk Hildebrand, who afterward became the great Gregory VII —the author of the investiture conflict with the emperors.

Leo X (Pope, 1513–1521) was a member of the rich Medici family of Florence, the son of Lorenzo the Magnificent, and was made a cardinal-deacon at the age of 15. The wise and affectionate counsel which his father gave in a letter when the boy first set out for his duties in Rome still exists. He was elected pope on the death of Julius II, at the age of 38. His reign saw the beginning of Luther's revolt against the church, increasing danger to eastern Europe from the Turks, and a continuance of the political struggles and wars involving the Papacy begun by his predecessor. But Leo X is chiefly remembered for his part in the Italian Renaissance, as the liberal patron of Raphael and other artists, and of numerous scholars, poets, and other literary men. It was he chiefly who made Rome the successor of Florence as the literary and artistic capital of Europe.

Leo XIII (Pope, 1878–1903), the latest to bear this name, came to power at a time when the papacy had recently been deprived of its "temporal power" as ruler of Rome and the surrounding country. Like his predecessor, Pius IX, he refused all offers of compromise with the new kingdom of Italy, and remained a "prisoner" in the Vatican. He was a man of wide culture and high character, and in many things showed himself a liberal statesman, though he never ceased to uphold the necessity of restoring to the papacy its temporal power.

Leopard. This spotted animal of the cat family inhabits Africa, Asia, and the large islands of the Malay Archipelago. It is smaller than the jaguar,

THE SNOW LEOPARD



This animal, sometimes known as the "ounce," is a resident of the mountains in central Asia.

being about four feet long with a tail three feet in length. There is considerable variation among leopards as to size and color. They usually are pale

faun or tawny color with dark spots. The under surface of the body is somewhat lighter in color. There are also species which are solid black in color. The larger forms of southern Asia are commonly called "panthers." The leopard lives in the forests, and is a tree climber. It is agile and a remarkable jumper. It attacks the antelope, young cattle, pigs, and occasionally man.

The cheetah or hunting leopard of India is a slim species which is tamed and trained to aid in hunting. The ocelot is another leopard-like cat, with striped and spotted fur, found in tropical America and the southern United States. A full-grown animal weighs 25 pounds. (*See* Cat; Jaguar.)

Scientific name of common leopard or panther, *Felis pardus;* cheetah, *Gueparda jubata;* ocelot, *Felis pardalis.*

The MEN *who* FIRST CROSSED *the* UNITED STATES

LEWIS AND CLARK EXPEDITION. When President Jefferson, in 1803, dispatched Captain Meriwether Lewis and William Clark to explore the land west of the Mississippi River, he was not obeying a sudden impulse arising from the purchase of Louisiana in that year, but was carrying out a plan he had cherished since 1783.



WILLIAM CLARK

Lewis parted from Jefferson at Washington within a few days after the receipt of the news from Paris announcing the Louisiana Purchase. But not until May 1804 did the party of explorers leave St. Louis on their 8,000-mile journey, which was to last two years and four months. The party consisted of about 30 persons besides the leaders. One of the most interesting of its members was the Indian squaw Sacajawea, or the "Bird Woman." She was one of a tribe of Indians who lived in Idaho, and had been captured five years before and sold to her husband, who acted as an interpreter for the party. The leaders found her of great service in guiding them up the Missouri River and across the mountains to the Columbia, though "often her intellect appeared too dull to have comprehended what she saw during her descent of the Missouri." But this was not surprising, since no Indian could be expected to know the value of such explorations. (For route of the party, *see* United States, historical map.)

The leaders had expected to have difficulties with hostile Indians, but they wrote in their journal that they "experienced more difficulties from the navigation of the Missouri than dangers from the savages." These were due to its swift current, numerous snags, and caving banks, which threatened shipwreck to their frail canoes. Much of the time Lewis traveled on foot hunting, collecting specimens, and examining the country. Among their greatest troubles were the "trio of pests—mosquitoes, eye gnats, and prickly pears—equal to any three curses that ever poor Egypt labored under."

In the last week of October, after ascending the Missouri River for 1,600 miles, they reached a village of the Mandan Indians near the present site of the city of Bismarck, N. D., and went into winter quarters. From there they sent back letters to President Jefferson, together with nine cages of living animals and birds, besides boxes containing specimens of rocks, plants, Indian dress, etc.



MERIWETHER LEWIS

After five months spent at Fort Mandan the expedition started out again. Clark wrote that he "could not but esteem this moment of my departure as among the most happy of my life." Passing the mouth of the Yellowstone, the party continued up the main river until they came to the Great Falls of the Missouri, a veil of spray 80 feet high descending between lofty cliffs of solid rock. Their Indian guide showed them how to make wheels of cross-sections of the cottonwood, on which to carry the boats the 20 miles around the Falls.

From there on Bird Woman was the guide. They had passed the gate of the Rockies and were in a labyrinth of streams and passes. At the three forks of the Missouri—which the explorers named after the three statesmen, Jefferson, Madison, and Gallatin—they took the South Fork—the Shoshone trail. After a long journey, the tepees and grazing ponies in the Shoshone valley were a welcome sight.

Leaving Bird Woman and her husband to visit her people, Shoshone guides led the explorers across the coast range to the Pacific. The last stage of the journey was by boat on the Columbia River. They reached its mouth and pitched their camp by the Pacific Ocean on Nov. 15, 1805.

There on the Pacific coast the party spent the winter of 1805–06. Lewis and Clark spent much of their time writing in their journals the accounts of what they saw, the Indians they met, and the customs of the strange tribes. The men were employed in hunting and preparing food, and in making clothes for the return trip, which was begun the last of March.

The Bird Woman and her husband returned across the mountains with them to the Mandan village, and were paid $500 for their services, a sum sufficient to build them a good cabin and buy many ponies. A statue of Bird Woman, with her papoose on her back, was one of the attractive features of the Lewis and Clark Exposition at Portland, Ore., in 1905.

"BIRD WOMAN"



This statue was erected at the Lewis and Clark Centennial Exposition in honor of the Indian woman who guided the famous explorers.

The explorers reached the Mississippi again in September 1806, and their reports excited the liveliest interest. The vast fertile plains, the lofty mountains and the beautiful valleys, and the mild climate of the Pacific coast fired the imagination; and soon settlers began to pour into the new regions.

The members of the exploring party were given honors and large grants of land. Lewis was appointed governor of the territory of Louisiana. But his mind became unbalanced as a result of hardships, and he committed suicide in 1809, at the age of 35. Captain Clark returned to the army, and was in 1813 appointed governor of the Northwest Territory and superintendent of Indian affairs. He died in 1838. Not until 1903 were the valuable journals of Lewis and Clark published in full and complete details given of this most remarkable expedition.

LEXINGTON AND CONCORD, BATTLE OF. The American Revolution began on Apr. 19, 1775, with the battle of Lexington and Concord. Some time before, General Gage, the military governor of Massachusetts, had received orders from England to arrest and send to England for trial two men, Samuel Adams and John Hancock, who were accused of stirring up rebellion in the colony. On the night of April 18 Gage sent a detachment of troops of 800 men to Lexington, where the "traitors" were staying. His orders to the troops were to arrest the two men, and then push on to Concord to destroy some military supplies stored there by the colonists. News of the expedition leaked out, and two of the "minutemen," (as the colonial militia were called), William Dawes and Paul Revere, rode through the country, warning the inhabitants that the British regulars were coming. As a result, when the troops reached Lexington they found about 50 minutemen drawn up on the Lexington common, an open square in the center of the town.

Pitcairn, the British commander, ordered the rebels to disperse. When they refused, the British opened fire, killing eight and wounding ten. The others, being too few to fight, sullenly dispersed, and the British went on their way toward Concord. Hancock and Adams, warned of the coming, had already fled.

The soldiers arrived at Concord at seven o'clock that morning. During the night the colonists had hidden most of their stores and ammunition. Such as they had not been able to hide, the British set about destroying. While they were about this work, they met the minutemen at the old North Bridge over the Concord River, and fired upon them. The shots were answered by the Americans, and the war was begun. In this skirmish the British numbered about 200, the Americans, 400. The Americans soon poured over the bridge and the British retired.

After resting for a while, the British began their retreat to Boston about noon. Meantime, the embattled farmers had been gathering from far and near, and from behind rock, fence, and building, they picked off the brightly clad soldiers as they hurried along the road. At Lexington, the fleeing redcoats were met by another detachment of 1,500 soldiers sent out by General Gage. Thus strengthened they returned to Boston, having lost 274 killed and wounded, and 25 missing. The American loss was 88 killed and wounded.

Today in the sleepy little village of Lexington, there are still standing Monroe Tavern, which on Apr. 19, 1775, served as British headquarters, Buckman Tavern, which was the American headquarters, and the Hancock-Clarke house where Adams and Hancock lodged the night before the battle.

Concord also contains memorials of the struggle there, the most notable being the sculptured figure, called 'The Minute Man', mounted on a granite pedestal on which are cut these words of Emerson:

> By the rude bridge that arched the flood,
> Their flag to April's breeze unfurled,
> Here once the embattled farmers stood
> And fired the shot heard round the world.

LIBERIA. This negro republic on the west coast of Africa just north of the Equator is the only part of the "black man's continent" except Abyssinia that is

not controlled by some European power. It is also of interest because it was founded as a refuge for liberated slaves from the United States. Its constitution and flag are modeled after those of the United States, and Monrovia, its capital, is named after President James Monroe. It was founded in 1822 by the American Colonization Society for free blacks, for whom there was then little place in the United States, either north or south.

The Liberians proper—the civilized and Christian descendants of American negroes—number about 12,000 and live in a few settlements on the coast or a few miles inland. There are also about 50,000 "coast natives," who are partly civilized, and between 1,000,000 and 2,000,000 "bush niggers," living in the forests of the interior, who belong to many different tribes and speak only their native tongues. The country has about 350 miles of coast-line and is little larger than the state of Ohio—about 43,000 square miles. Five-sixths of it is covered with dense tropical forests, from which are obtained the country's chief exports—palm oil, palm nuts, piassava fiber, rubber, coffee, and cocoa. Agriculture has been little developed, and there is practically no manufacturing. As a result of the difficulties of communication, the interior of Liberia is as little known to the Liberians as to the world at large; but there is no question that the country possesses great natural wealth, including iron, gold, copper, and other minerals. The climate has been called the hottest on the globe.

For many years after 1847, when Liberia became an independent government, the United States took little interest in its development, although it was called upon more than once to protect the little country from the encroachments of its neighbors. In 1910, however, the United States government assisted Liberia in straightening out its financial affairs and strengthening its internal conditions, and Liberia has since been under United States protection. During the World War of 1914–18, like many other small countries, it followed the example of the United States in declaring war against Germany.

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How Books are Kept for the Use of All—Collections of Antiquity and Tremendous Institutions of the Present Day—How to Find the Information You Want

LIBRARIES. "Three minutes after school is dismissed in the afternoon the line begins before the library desk. Ten minutes, and it reaches across the room. Fifteen minutes, and it is down the stairway to the door and into the street. Fifteen hundred children with eager faces have been counted draping the stairway and winding around the building and three blocks about the square, all patiently waiting 'to take libraries.'" Thus the children of New York City throng the Public Library; and boys and girls in other cities throughout the United States frequent their libraries just as eagerly. Special books for children, and, in many places, special rooms where they may browse among the open shelves and choose what they wish of the treasures ranged there, are among the great modern developments of the library.

Every boy and girl should know how to make use of a library and thus be able to get from it the advantages it offers. In order to draw books for home reading one must secure a card, either by signing a pledge to obey the rules and take good care of the books used, or by obtaining the signature of some responsible person who acts as guarantor.

There are a few simple devices which serve as keys to the library's stores, and everyone should know how to use these keys. The most valuable is the card catalog, alphabetically arranged by author, title, and subject, as is a dictionary or encyclopedia. If you wish a particular book and know the author, look for the author's name and you will find after it all of his works that are in the library. Suppose you wish Francis Parkman's 'La Salle and the Discovery of the Great West'. Look under *Parkman, Francis,* and you will find the card for this book, and in the upper left-hand corner the "shelf number" which you must give in calling for the book. You can find the book also by title, under *La Salle.* If you do not know either the name of the author or the exact title of the book, but recall in a general way that it is about discovery, you can look under *Discovery* and you will find it listed there also.

But perhaps you do not have any particular books in mind, but wish to gather information on some large subject, such as *Airplanes.* Look under this heading and you will find a long list of books from which to choose the ones that seem best adapted to your needs. If you wish information in regard to current events, recent discoveries, and the like, the best place to find it is in periodicals. The 'Readers' Guide to Periodical Literature' and Poole's 'Index to Periodical Literature' are the keys to this material. In these guides you will find the articles listed under author, title, and subject, very much as books are listed in the card catalog, with a reference to the name, volume, and page of the magazine where the article is to be found.

There is only one desire that the public library does not satisfy, and that is the love of collecting books of one's own. Everyone who loves books wants to have a shelf of his own favorites, which he can read and re-read and learn to know as familiar friends. And so, while public libraries multiply and become more efficient, private libraries still continue.

Libraries—by which we mean either collections of books or the places where they are kept (from Latin *liber,* meaning "book")—are almost as old as civilization. More than 600 years before Christ, King

Assurbanipal of Assyria gathered a great collection of clay tablets—for such were the books of that time—for the great library in his palace at Nineveh; and recent excavations at Nippur in Babylonia have laid bare another library which even in his day would have been considered ancient, for it dates from about 3000 B.C. The greatest of all ancient libraries was that at Alexandria in Egypt established by the Ptolemies (*see* Alexandria). This vast library contained most of the literary treasures of the Mediterranean world, but in the repeated calamities which Alexandria suffered in the early centuries of our era it was gradually destroyed.

None of the ancient libraries nor those of the Middle Ages were public libraries. In the medieval monastic and cathedral libraries, it was often the practice to have scarce and very costly books fastened to the reading desks by chains. The great public libraries of today, to which everyone has access and from which everyone may freely draw books, did not come until comparatively recent times.

IN ANTIQUITY'S GREATEST LIBRARY



If it were not for the flowing garments of the men and the rolls of parchment, we might well believe ourselves in some great modern library, instead of in an alcove in the great library of Alexandria. This library was founded by the Ptolemies, and until it was destroyed in the early centuries of the Christian era, was the greatest library in the world.

Benjamin Franklin has been called the father of the circulating library, through his founding of the first subscription or share-holding library in Philadelphia in 1732. The use of this was restricted to subscribers, but it was a step in advance toward the free circulating library of today.

It is in the United States that we find the greatest number and the most efficiently managed libraries intended for the use of the people. Many of these libraries were made possible through the generosity of Andrew Carnegie, who gave more than $60,000,000 for this purpose (*see* Carnegie). All who can read and write are not only welcomed but urged to make use of the public library. The needs of young and old, the scholar, the business man, and the mechanic—those seeking technical information and those desiring recreation—all are considered. Many libraries collect music and prints as well as books; and story-telling for the children is a leading feature in many places. There are books with raised letters for the blind, and books in foreign languages for the immigrants from every land. In large cities dozens of branch libraries are maintained, and traveling libraries, often supported by the state, carry books to the rural districts and to towns too small to support libraries of their own. Next to the public school, the public library is the greatest educational and Americanizing force in the United States.

The largest library in the world is the Bibliothèque Nationale at Paris, the national library of France. Its more than 5,000,000 books, manuscripts, maps, and prints have been accumulating since its foundation in the 14th century. The British Museum at London is only slightly smaller in size and is said to surpass the Bibliothèque Nationale in the value of its contents. The Vatican Library at Rome, founded in the 15th century, is exceedingly rich in manuscripts and books of great historical value. It is the private library of the pope, but scholars from all over the world are permitted to consult its collections.

The Library of Congress at Washington ranks close to the great libraries of France and England. Two copies of every book, map, print, or musical composition copyrighted must be deposited in this library (*see* Copyright and Trade-Marks). Its catalog contains more than 3,000,000 items.

IN AMERICA'S LARGEST LIBRARY

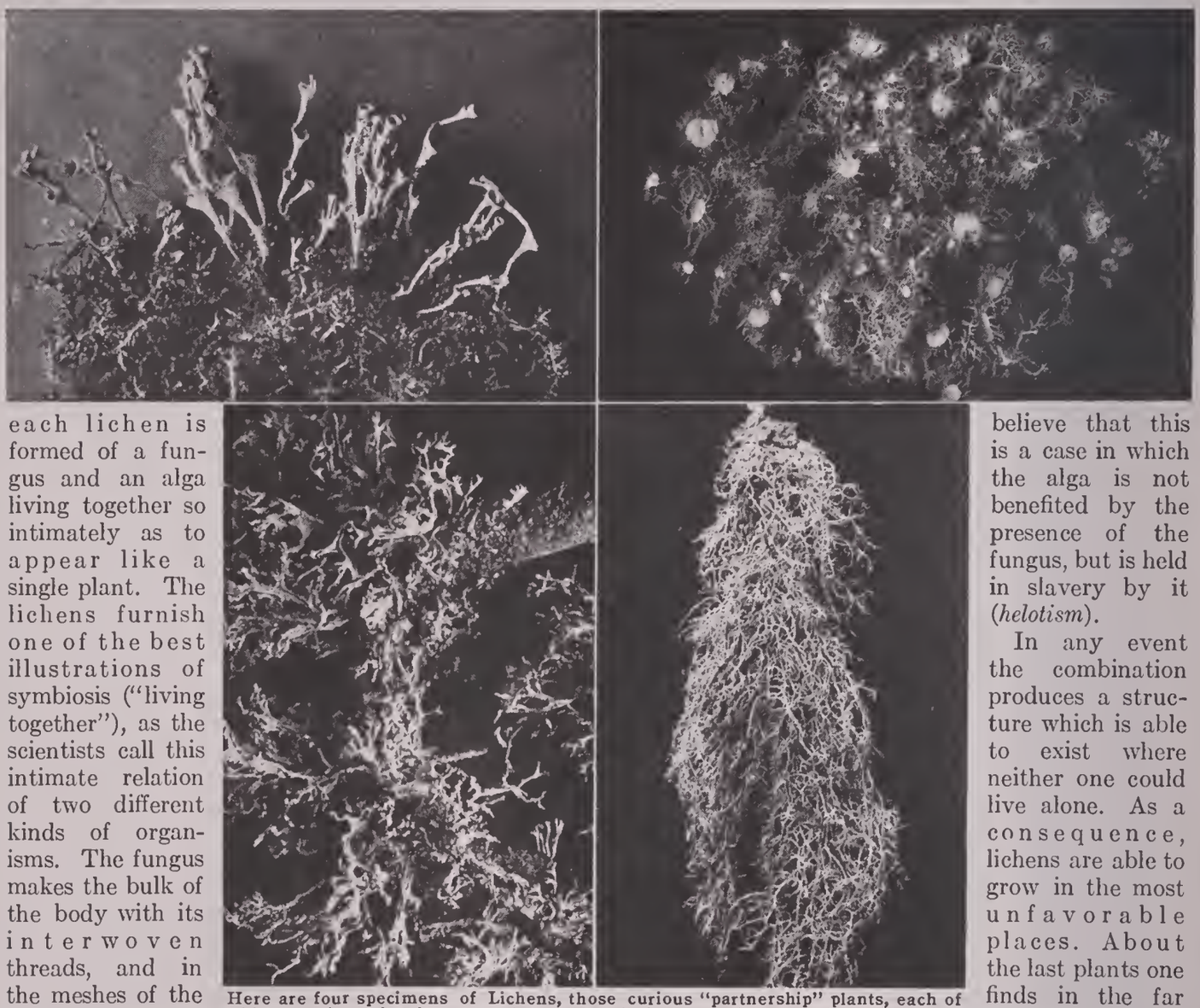


This is the central rotunda in the Congressional Library where readers consult catalogues and obtain the books they want. This library lists over 3,000,000 items, and is the leading institution of its kind in America.

contained in the Easy Reference Fact-Index at the end of this work

LICHENS (*lī'kĕns*). On tree trunks, rocks, old boards, etc., and also on the ground we often see those queer splotches of various-colored plant life which we call "lichens." They are of great scientific interest from the fact that they are not single plants, but each lichen is formed of a fungus and an alga living together so intimately as to appear like a single plant. The lichens furnish one of the best illustrations of symbiosis ("living together"), as the scientists call this intimate relation of two different kinds of organisms. The fungus makes the bulk of the body with its interwoven threads, and in the meshes of the threads live the algae. The special fungi which take part in this arrangement are almost never found growing separately, but the algae are found growing free.

PLANTS THAT FORM "PARTNERSHIPS"



Here are four specimens of Lichens, those curious "partnership" plants, each of which consists of a fungus and an alga. It is a peculiarity of the fungi, that, having no green coloring matter (chlorophyll), they are unable to manufacture their own food. So certain ones of them combine with the algae, which have the food-making power. In return the fungi shelter the algae and gather moisture for the partnership.

Lichens have a peculiar and effective method of propagation. Upon the surface of the body there are commonly seen minute granules which give the body a dusty appearance. These granules (called *soredia*) each consist of a few cells of the alga surrounded by threads of the fungus. When these soredia are blown off they start new lichen bodies.

By many it is thought that the fungus and the alga are mutually helpful in this intimate relationship (*mutualism*). The claim is that the fungus, being unable to make food for itself owing to its lack of green coloring matter, uses the food made by the alga; while on the other hand the alga is protected from drying out by living on the sponge-like network of the fungus threads. There are others who believe that this is a case in which the alga is not benefited by the presence of the fungus, but is held in slavery by it (*helotism*).

In any event the combination produces a structure which is able to exist where neither one could live alone. As a consequence, lichens are able to grow in the most unfavorable places. About the last plants one finds in the far north or up on a high mountain are the lichens; and they are about the first plants to be found upon rocks brought above the surface of the ocean. In such exposed situations the fungus could not live, because it depends upon other organisms; and the alga could not live, because it would be dried out speedily; but the two can live together. In this way lichens play a very important part in the first stages of soil formation on bare rocks.

Certain kinds of lichens, such as the ones called "Iceland moss" and "reindeer moss" are used as food by reindeer and even by man. Other kinds produce dyes, drugs, etc. (*See* Algae; Fungi; Litmus.)

Licorice. The licorice drops and sticks and slender "whips" which are found in every candy store are made from the juices of a plant that grows in many warm countries. The juice is obtained from the long pliant roots which extend straight down into the ground for more than a yard. The plant is cultivated throughout the warmer countries of Europe, especially on the Mediterranean shores, and to some extent in Louisiana and California. The best grades come from Spain and Italy. It takes three years to bring a licorice plantation into bearing.

"Stick" licorice is made by straining and concentrating the solution left after boiling the ground and crushed roots. Licorice extract does not crystallize, but becomes thick and heavy and can be rolled out. The drops and other licorice candies have sugar mixed with them. Licorice enters into the preparation of many cough drops and cough syrups and is also used to cover up bitter or unpleasant tastes in medicine. The tobacco manufacturer also uses it in making "plug" tobacco to give body and flavor.

There are a dozen or more varieties of licorice plants, of which *Glycyrrhiza glabra* is the most important. They are perennial herbs, 3 or 4 feet high, with fernlike leaves and flowers usually pale violet. The name comes from Greek words meaning "sweet root."

Liége (*lē-ĕzh'*), Belgium. Even in the Middle Ages Liége was one of the arsenals of Europe. Knights were supplied with lances and armor from its smithies, and the popular motto, "Faithful as a dagger of Liége," attests the sound craftsmanship of its workers. Today the rich coal mines which lie in the valley of the Meuse River, on which Liége is situated, make it the chief manufacturing center of Belgium. The smoke of a thousand tall chimneys hangs over the roofs of the "Belgian Birmingham," as it is called, which like its English namesake is famous for the manufacture of cannon and firearms of every description, together with steam engines, machinery, hardware, and textiles. But amid the smoke haze of modern factories, an ancient university and many stately buildings of old and beautiful architecture remind the traveler of the earlier days of Liége.

The history of Liége (German "Lüttich") goes back to St. Monulph, who traveled through the beautiful Meuse valley in the 6th century. Greatly impressed with the beauty of the country, he stopped at the juncture of the Ourthe and Meuse rivers and said, "God has chosen this place for the salvation of many people. Here must be raised a great town." The chapel which he built was the beginning of the present city, and also of its rule by the bishop, which lasted until 1795. For many centuries the "Prince-Bishops of Liége" sat in the diets of the Holy Roman Empire, and the city was famous as a center of religion and learning long before its mineral wealth was suspected. Today Liége is the center of the Walloon culture, akin to the French. While the Burgundian dukes were ruling the Netherlands, Charles the Bold sacked the city and razed its walls in punishment for a rebellion (1467).

At Liége was fought the first great battle of the World War (Aug. 4 to 9, 1914). The resistance of its girdle of strong forts delayed the German advance for more than a week, upset the German "time-table," and enabled the French and British to prepare the resistance which stopped the Germans on the banks of the Marne. During the four years of German occupation the Belgian factories were systematically destroyed and looted of their machinery by Germany. Population, about 167,000.

Life-saving service. Angry waves beat upon the wrecked steamer frantically flashing its signal-light over the foaming swirl of waters. On the shore brave men in oilskins are feverishly arranging lines and rigging, and elevating the muzzle of a small cannon pointed towards the boat.

"Ready!" cries the life-savers' captain; "fire!" The cannon booms, shooting forth a projectile with attached life-lines to the deck of the sinking vessel. The crew seize this and haul out and make fast a cable along which runs a pulley carrying the queer-looking "breeches-buoy" (a large life-preserver with a pair of canvas trousers attached) with lines for hauling it to and from the vessel. "Haul away!" commands the captain, and presently the first of the rescued persons arrives in the breeches-buoy, riding over or even through the dashing waves. Thus one by one the ship's crew and passengers are pulled to shore—and to safety. Stirring scenes such as this are frequent events in the lives of the brave men of the life-saving service.

In nearly all maritime countries life-saving stations are found, but the service in the United States, which has been united with the Revenue Cutter Service under the name of the Coast Guard, is particularly noteworthy. Organized under the present arrangement in 1871, this service today has about 285 stations located along the 10,000 miles of dangerous coast in 13 definite districts in the United States, including the Great Lakes. On the Atlantic coast and the Gulf of Mexico are 203 of these stations. In each station live the crew—consisting usually of from seven to nine men—who go through a rigid course of drills and definite daily duties, keep long day and night watches for disasters on lake or sea, and keep in constant readiness their life-saving equipment. This consists of a surf boat (22 to 27 feet long, 6 to 7 feet beam, and with air chambers to make it unsinkable) or a self-righting and self-bailing boat (36 feet long, 8½ feet broad, and equipped with similar air chambers as well as with gasoline engine, sail, and oars); breeches-buoy; iron-covered life car which opens at the top, and carries 5 or 6 persons, run like the breeches-buoy; a bronze cannon to use for shooting the iron bar projectile with the light and strong lines up to 700 yards; a rocket with a coil of rope at its head, which is used sometimes instead of the cannon and goes 1,000 yards; beach cart, pulmotor, etc. The stations are in operation from eight to twelve months each year. Every season many acts of heroism are

THE CANNON THAT SAVES LIVES



Most cannon are built to kill, but this life-saving mortar exists to preserve people from death. It fires a shot to which is attached a small cord, which unwinds as the shot sails out over the wrecked vessel. With this slender cord, the men on the wreck haul out a larger cable capable of supporting the weight of the persons to be rescued, who are then hauled to safety in the breeches buoy.

For any subject not found in its alphabetical place see information

performed by the brave crews. In a single year they have saved 2,150 lives.

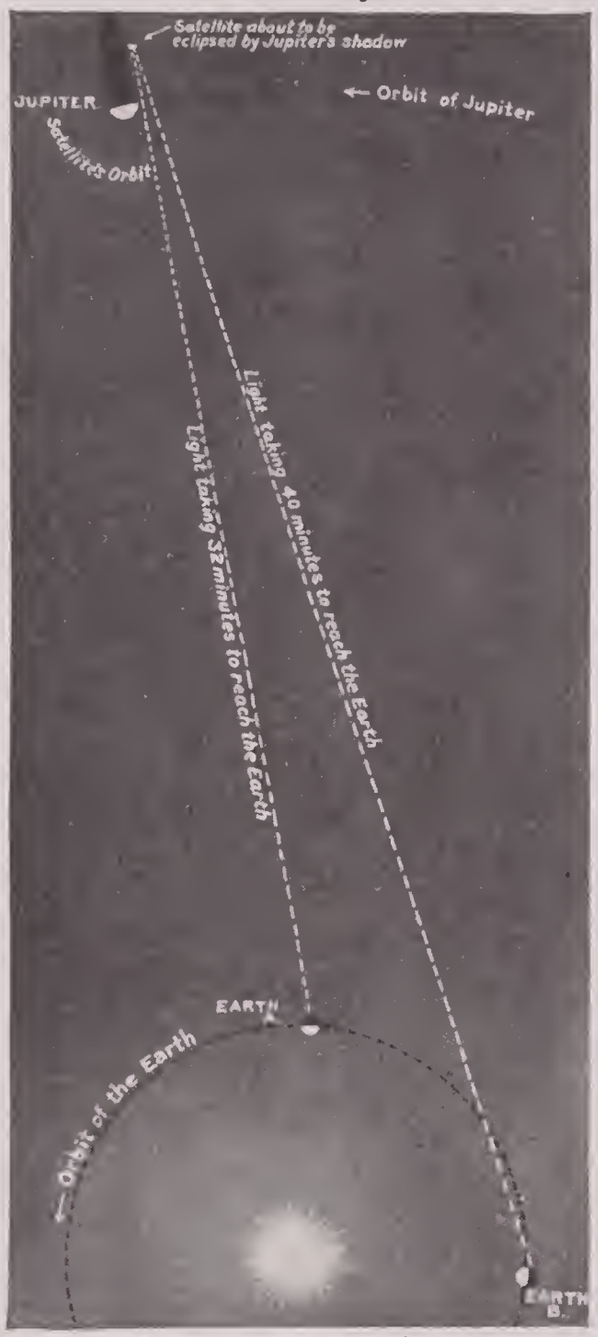
Very dangerous shores, such as those of Cape Cod and southern New Jersey, have chains of stations within communicating distance of each other. Although the Life-Saving Service in the United States and Canada is a branch of the government, in other countries it is usually controlled and supported for the most part by private institutions. Canada's life-saving service is a branch of the Dominion Department of Marine and Fisheries, and maintains 38 stations on sea coasts and Great Lakes.

WHAT SCIENTISTS KNOW *of the* MARVELS *of* LIGHT

The Swift Messenger that Travels 186,000 Miles a Second — Amazing Facts and Ingenious Theories about this Form of Energy, to which We Owe Our Very Existence

LIGHT. The speediest traveler in the universe is a beam of light. In the double tick of a clock, it can go around the earth more than seven times. Indeed, so fast does light travel that, until 250 years ago, the best of scholars thought it went instantly from place to place. And compared to most other moving agents about us, light does travel "instantly." Sound travels through the air at about 1,100 feet a second, more than ten times the speed of the fastest railroad trains; and yet sound seems to stand still, when light goes by. You see the distant lightning several seconds before you hear the thunder; the sound started at the same time as the light, but the light came "instantly" as we say.

But light does not *really* come instantly. The first person to show that light actually takes time to go across space was a Danish astronomer, Ole Roemer. In 1676 he showed, from the motion of the little moons that revolve about the planet Jupiter, that it takes a longer time for light to come from Jupiter at the season of the year when the earth is farther away from Jupiter, than at the season when the earth is nearer to Jupiter. It was not, however, until 1849 that a method was found to measure the time that light takes to travel a distance on the earth. This was done at Paris by a French professor, Armand Fizeau. He chose two high towers or stations something more than five miles apart. At the first he had a bright light, and at the second he placed a mirror, which reflected the beam of light directly back to the first station. Then he put at the first station a revolving toothed wheel, a sort of cog wheel so arranged that the beam of light went out through the openings between two teeth. It was reflected back through the same opening, when the wheel was at rest. But when the wheel was revolved rapidly enough, the light that came back found that a tooth of the wheel had moved into the place of the opening; thus no light could be seen reflected from the second station. The time which the light took to travel from the first station to the second, and back again to the first station, was thus the time that it took a tooth of the wheel to move to the place of the opening. By doubling the speed of the wheel, Fizeau could again see the reflected light, because a second opening had now moved into the line of sight. From a speedometer he could get the number of revolutions of this toothed wheel and thus calculate the time that it takes the light to travel between stations and back. By this and similar methods, the velocity of light has been determined with great accuracy. The best measurement is that made by an



The fact that light did not travel "instantaneously" from place to place was first learned by watching the eclipses of Jupiter's moons. The time at which these eclipses should occur was calculated, but when obvervations were made while the Earth was at position "B" in its orbit, the eclipses seemed to occur several minutes later than when viewed from position "A." The difference in time could only be due, scientists concluded, to the fact that light took longer to reach "B."

contained in the Easy Reference Fact-Index at the end of this work

American professor, A. A. Michelson of the University of Chicago. He found the velocity of light to be 186,534 miles a second.

Speedy as light is, the distances in the heavens are so great that even to get from the sun, light needs eight minutes, for the sun is 93,000,000 miles away. To come from the nearest fixed stars, light takes more than four years; and many stars are so distant, that the light that we saw last night started hundreds of years ago. (*See* Astronomy.)

And what is light, this swiftest of all messengers? We can think of only two things that can travel across space, either *matter* or *motion*. That is, we must think of light as some fine material *substance* thrown off by bodies; or we must think of light as a *motion* set up in some medium. Sir Isaac Newton, the greatest scientist of his day, believed that light was a material substance, and that a beam of light was a stream of fine particles. These particles of light, he knew, must be so much smaller and lighter than any known of matter that he called them "corpuscles." Hence this material theory of light was called the "corpuscular theory of light." We now know that Newton was wrong, and that light is not matter.

The "Wave Theory" of Light

Then how are we to explain light? Let us go back for an idea to a sport of our childhood. The boy throws a stone into a smooth pond or pool to watch the waves it makes on the surface of the water. These waves go out in circles, and these circles travel outward until they are deflected from some floating plank, or perhaps not until they reach the shore. In Holland about 250 years ago there was a great mathematician and scientist who found in water waves a suggestion of what light is. This great man was Christian Huygens, who in 1690 published a book in which we find the wave theory of light which scientific men hold today.

Of course light cannot be a wave motion in a heavy substance like water. Huygens said that there must be a substance which is far thinner than the lightest gas, a substance which has no conceivable weight, and so fine that it penetrates between the smallest molecules and atoms, and that spreads through all space to the farthest star and beyond that. This substance is the ether (also spelled aether). The only way we can know ether is by the waves in it, which we call light waves, electric waves, radiant heat waves, and X-rays. (*See* Ether.)

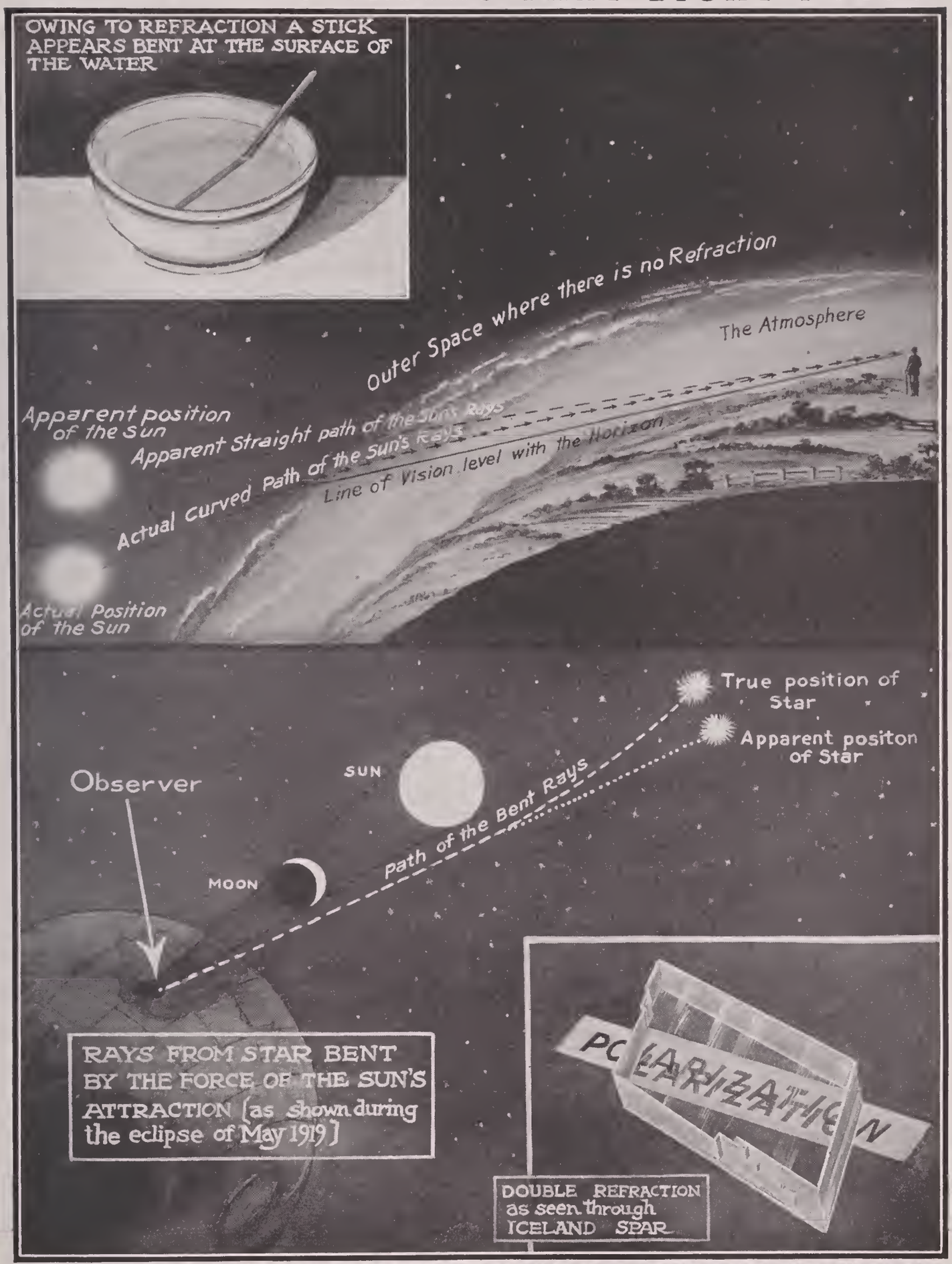
Professor Michelson, who as we have seen has measured the velocity of light with such exactness, has also invented a beautiful instrument which enables us to measure the length of light waves, the "interferometer." In this instrument two beams of light, traveling different lengths of path, can be brought together so as to produce darkness, that is, so as to annul each other. Now we cannot think of adding together two material substances and get nothing. But we can think of adding together two motions, one *up* and the other *down* and get *no* motion. Thus, if two waves of light are brought together by the interferometer so that the crest of one wave and the hollow of the other wave fall together, they interfere with each other and produce darkness. This is called the "interference of light." With the aid of Professor Michelson's instrument, the incredibly small distance between crest and hollow of a light wave can be measured with the greatest accuracy. For a certain shade of yellow light, called "sodium light," the wave length, that is, the distance from crest to crest, is 579 millionths of a millimeter, or about $\frac{1}{45000}$ of an inch. In other words, along a beam of yellow light, there are 45,000 waves in an inch.

Each color has a different wave length from any other color. Thus the wave length of red light is about one-third longer than that of yellow light; and the wave length of violet light is about one-quarter longer than that of yellow light. Indeed what we call color is different impressions which lights of different wave lengths make on our eyes. Besides these waves which are visible to our eyes, there are other ether waves which are invisible, some of them because they are too short, and some because they are too long. The short invisible light waves are called "ultra-violet" rays, and the shortest of all invisible rays are the X-rays. While these short rays do not affect the eye, they do darken photographic plates and make phosphorescent screens glow, and are in this way detected and studied. The ultra-violet rays are instantaneously destructive to bacteria and so are often used to purify water. The long invisible light rays are called "infra-red" rays or radiant heat rays. There are still longer ether waves, which are produced entirely differently from ordinary light, called "electric waves" (*see* Electricity; Wireless Telegraph and Telephone). All these waves have the same velocity that is, about 186,000 miles per second.

An ordinary beam of light, sometimes called *white* light, is made up of all the different wave lengths of the different colors vibrating so as to keep exactly together in their travels. The tiny ray of light coming through a pin prick in the curtain of a darkened room has all the colors of the rainbow. If the different wave lengths are sorted out as is done by the raindrops or the glass prism (*see* Spectrum and Spectroscope), the beam of white light will divide into the separate rays for the entire scale of colors visible to our eyes, from red to violet.

Most Light Comes with Heat

How do we get light? How are these little ether waves started? Our chief source of light is from hot bodies. The greatest source is the sun, which is hotter than any body on the earth, hotter even than the electric arc. The stars are also hot suns. To light our homes we use the flames of the candle and oil lamp, or the heated mantle of the Welsbach burner, or the hot filament of the incandescent electric lamp. The oscillating atoms of these hot bodies somehow start ether waves, which we perceive as light.



The same distortion that refraction produces in the appearance of the stick under water enables us to see the sun for some time after it has really "set." Astronomers have also found, when eclipses enabled them to observe light rays passing near the sun, that they were bent by the "pull" of the sun's gravity. Double refraction, producing two images, takes place when the refracting body transmits light unequally in different directions. This is one of the ways in which light may be "polarized."

contained in the Easy Reference Fact-Index at the end of this work

But not all sources of light are hot. Did you ever catch the dazzling little fireflies that are seen in thousands on a summer evening in many parts of the United States? You have found little if any heat there, and yet the firefly gives off considerable light. There are also so-called phosphorescent substances, such as are used in luminous paints, which glow in the dark without measurable quantities of heat. But no man has yet produced a source of bright light without heat. Even the best of tungsten lamps turn only a small fraction of the energy used into visible light.

When light strikes against an object it is reflected in a new direction, just as a ball thrown against a wall is bounced or reflected back from the wall. It is only by the light rays reflected from their surfaces that we are able to see objects. From these reflected rays we learn the size, shape, and color of an object. The color depends upon which wave lengths are reflected from the surface of an object, and which are absorbed. For example, a book that reflects the waves of red light and absorbs the others is red. One that absorbs nearly all the colors is black. The direction reflected light takes is determined from the following law: "The angle of incidence equals the angle of reflection." This means that a ray of light will depart from a reflecting surface at the same angle at which it arrived.

Some objects, like glass, offer very little hindrance to the light rays and let them pass right on through. Such objects we call transparent. The light waves travel almost as easily through glass or ice as through air, and that is how we are able to see objects on the other side of them. In traveling through such objects, the path of the light ray is slightly bent to a new direction. This bending of the ray of light in passing from one medium to another is called "refraction." When a straight stick is thrust into water as shown in the illustration on page 1999, it appears to be bent at the surface of the water. The stick is not bent, of course, but the rays of light reflected from the stick are bent or refracted in coming from the water to the air, and so it looks to us as if the stick itself were bent. Although light rays are refracted in the same way by window glass, for instance, we do not usually notice it, because they are refracted in opposite directions at each surface of the glass, and so the second refraction cancels the first, so to speak. In prisms and lenses, however, where the surfaces of the glass are not parallel, the refraction of the light rays is the important function (*see* Lens).

There is another interesting property of light called polarization. Certain transparent crystalline substances, like Iceland spar and tourmaline, cut off some of the light vibrations, and light passing through such crystals is said to be "polarized." If you could look at the end of a greatly magnified ray of light, you would see the vibrations going up and down, crosswise, and in every possible plane, like the cracks in the cross-section of a log. Now when this ray of light passes through a thin slice of tourmaline, all the vibrations are shut out except those in the direction of its axis, straight up and down, for example, just as though the ray had come through a narrow door which shut out all the crosswise vibrations. And if two tourmaline slices are crossed, so that the axis of the first crystal is up and down and thus shuts out all the crosswise vibrations, and the axis of the second crystal is crosswise so as to shut out all the up and down vibrations, no vibrations get through at all and no light passes through the two crystals. When the polarized rays are passed through certain substances they are bent to the right, and in others to the left. This fact is used for testing many substances. Sugar, for example, when dissolved in water, bends or rotates the rays of polarized light, and the stronger the solution the greater is its rotary power. Furthermore, cane sugar rotates the rays to the right, while grape sugar turns them to the left, and so these sugars can be easily distinguished when tested in a polarizing instrument, called a polariscope.

Some of the Wonders of Light

THERE could have been no world for us at all, no life at all, without light. We have only to think of the terror that would seize us in the morning if the earth should not come around again to the sun, to realize what we owe to light. It has given us all the color of the earth, the glory of the oak, and the sweetness of the rose. It has opened for us the gates of knowledge; it is the source of health and beauty too. If we will pave the way it will banish all disease. It is the power that lies behind the existence of the human race, for without it no food would grow upon the earth, and Life itself would perish.

It has taken thousands of years for men to understand what light is, and there is no wonder, for few things are more baffling to the mind. Even now we do not understand it. It used to be thought that light darted out from the sun as a bullet darts out from a gun, but men did not know in those days that if light had been a thing like that—something that could have been picked up and flung away—the grains of it would have reached the earth with such force as to fall on us like stones or cannon-balls. We now believe that light is a wave motion in the ether, the marvelous stuff that fills all space and goes through everything.

Much as diligent students have learned about light, at times it seems as if we had just begun. In 1920 the world of science was startled to learn that a beam of light could be deflected by gravitational attraction. The gravitational attraction was that of the sun, a much stronger attraction than of the earth. The observation was made by a British astronomical party which was sent to Brazil to observe the total eclipse

VARIED USES MAN FINDS FOR LIGHT



In the upper left-hand corner is a physician using "violet rays" for the treatment of disease. To his right is a man making photographs by the action of light on sensitive chemicals. We all enjoy the result of harnessing light in the motion-picture, and the miner's lamp gives a light where nature would leave us in utter darkness. Light, utilized in headlights and signals, makes railroad operation safe at night, and by shining forth from lighthouses enables ships to avoid danger and make port at night as easily as by daylight.

of the sun. Prof. Albert Einstein of the University of Berlin predicted that light would be deflected by a strong gravitational attraction, and the observation had to be made at the time of an eclipse, when the light from stars passing near the sun could be seen and photographed. The deflection under this strong attraction is very minute, and even yet the explanation is not known with certainty. If new observations at later eclipses of the sun make these observations certain, we will have learned a new fact about the mysterious medium, the ether, and thus more about light. But most scientific men agree that the wave theory of light is essentially correct, even if our ideas of the ether are changed by new discoveries.

For this world, and all the worlds we know, the sun and stars are the central sources of light. But a ray of light is not flung out of the sun and thrown to earth as we throw a stone; it is not a thing apart that we can get hold of and carry from one place to another. A ray of sunlight is a continuous shaft that spreads for more than 90,000,000 miles, a mighty band of quivering ether, an unbroken chain moving up and down so fast that we can only compare the number of its little waves to the grains of sand on the seashore.

contained in the Easy Reference Fact-Index at the end of this work

We walk in the garden and stop for a moment to look at a little blue flower, and this wondrous shaft of light has sent 700 million million waves into the eye in a single second so that we should realize that the flower is blue! We are checked for a moment by the red flash of a danger lamp, and something in our eye has moved 400 million million times so that we might see red!

The human mind can hardly grasp these things, but they are the great simplicities of the universe. More than 50,000 of these little waves that bring light to us from the sun can come into a single inch, and they travel for some 93,000,000 miles. The very thought of such a journey makes us pause, but what shall we say of the energy that produces light? We see a blacksmith strike the iron till sparks fly from the anvil, and we know something of the energy that makes these sparks. But light is always being made in that way. It is not given off, as we may imagine, by a thing that lies still and does nothing. It is given off by atoms whose electrons are always revolving at so tremendous a rate that they make light, just as the molecules of a piece of iron do when the blow of the blacksmith's hammer sets them spinning faster and faster.

Picture an iron ball. It is made up of atoms spinning around at an inconceivable rate, but it is a black thing; it gives off hardly any light. Make it hot, and it will glow red; make it hotter, and it will glow white. The hotter you make it the faster its little atoms will spin around, and the whiter they will glow. It is no longer a dark thing; it is giving off light. What has happened is that the little atoms which were spinning inconceivably fast before are now spinning faster and faster still, so that they give off light as a meteor does in its rush through the atmosphere. Light, that is to say, is *a product of the energy of the atoms of which the world is made.* Each is a little engine of power; together what must their power be in any of our terms of reckoning? They work in silence and we think nothing of them, but they work forever without a moment's break, and they sustain in the world all the power and glory that we know.

What if the Sun Should Go Out?

But let us remember one thing. These engines of light are spending their power; their wheels will not go around for us eternally. They are laboring to make light; they pour it out upon the earth, and will go on pouring it until they have no more to pour. And then, when stars are old and sun grows cold, men say the world will shrivel up in death. But there are things that are not in the textbooks; and on the day the sun goes out—so we believe—Life, in some mysterious way, will have renewed its youth, and not one little child shall perish.

But now, while light is in our eyes, we can use it or can waste it; we have in our hands these engines of God. In a thousand wonderful ways we are learning to use light and to control it. We have used it to weigh the earth; it has helped us to measure continents. We can take a piece of light that has come 90,000,000 miles, and by means of the spectroscope we can split it up and tell what it is made of. As a boy opens a ball and finds out what is in it, so we can break up a sunbeam and say that one part of its light is made up of uncountable atoms of iron spinning in the depths of the sun, that another comes from atoms of nickel, another from copper, another from zinc. Two million million square miles of wondrous light shine on the face of the sun, and men can split up any single ray of it that falls upon our earth and tell us what it comes from.

It is only the beginning, but at least we can dream of what will come when men learn more of light and how to use it. When that day comes, at least we shall store it wisely instead of letting it run to waste. For ages and ages light was pouring down upon the earth on which no man lived, and Nature, who knew that man was coming, stored up the light for him, until at last man came and found it. It was hidden in coal, and today the light of the days before man existed is driving our engines and giving us heat.

The Wonderful Task of Storing Up Light

So wonderful a thing is light, with power beyond our dreams; and the day will come when men will think it treason to the world to waste this thing that we might save. For every child who sows an acorn, every town that plants a row of trees, every nation that is wise enough to preserve its woods and forests, is saving light as Nature saved it when she laid down coal. Who plants a tree gives light as well as beauty to the future.

Of the wonderful things that light has in store for the days to come we do not know, but they will be marvelous beyond our understanding now. Everybody knows how light takes photographs for us, and already light has made it possible to telegraph a photograph as easily as we telegraph a word—that is to say, a man can sit in a little room in New York, can photograph a procession passing his window, and can telegraph his picture to San Francisco, so that men may see it there while the procession is still passing by. It is the light that does that.

But this, wonderful as it is, is as nothing to the new gift that light is making now to the human race. It is almost too good to be true, but it is happening, and it may mean that the day will come when a blind man can read a book in any library—any book he likes, when he likes, almost where he likes. The book he cannot see will speak to him; the light that cannot reach his eyes will send a voice to reach his ears. Men have found a way by which light can govern sound, and what that means is that some day we may have a book that really speaks!

Something like a generation ago a man was working on the cables in Valentia Bay, Ireland. He had with him a stick of selenium, a rare metal discovered over a hundred years ago (1817) by Baron Berzelius, of Sweden, which we find in various forms, but chiefly get from the dust and ashes of certain chemi-

cal furnaces. The electrician of Valentia Bay was seeking something that would offer a high resistance to the flow of electricity at the end of a submarine cable, and the selenium stick acted like a wizard's wand. At one time it was a good conductor of electricity, another time it was bad; and puzzling out this mystery, the man found that the change was due to the light that fell on the selenium. This principle was at once applied in the "photometer" used by astronomers to measure the variations in intensity of the feeble light of the stars.

It was soon found also that light could now be converted into sound. A man arranged a mirror so as to reflect a sunbeam onto a lens. The lens fixed the sunbeam on a revolving disc, and the disc was bored with holes. The disc was made to revolve, and as it revolved the light from the sunbeam passed through the holes. Where there was no hole the light could not pass, so that there was alternate light and darkness beyond the disc.

These light-waves were focused through other lenses so that the light fell at rapid intervals on a piece of selenium, from which ran an electric current connected with a telephone. The electric current was stronger or weaker according to the light that fell on the selenium, and the effect of this on the telephone was to produce a musical note. For the first time light had been made to produce sound.

It was natural that the inventor of the telephone should be interested in this strange property of selenium, and Dr. Graham Bell made an interesting experiment in Washington. A friend went to the top of a school while Dr. Bell remained in a room 700 feet away. A telephone between them depended on the power of light-waves, and the man at the top of the schoolhouse said, "If you hear what I say, Dr. Bell, come to the window and wave your hat." He had hardly spoken the words when he was overjoyed to see Dr. Bell standing at the window below, waving his hat.

Turning Light into Sound

A big step forward had been taken, but there was still much to do before the great idea was to be realized. We need not trouble with the details here. They have been worked out and overcome in the brains of wise men and in the laboratories of science, and we are nearing the time when we can write "Success" upon one of the most astonishing achievements of the modern world. By an instrument called the phonopticon it is already possible to translate the whites and blacks of a printed page into an alphabet of sound, and we may look forward to the day when blind people will use it with ease. A blind person can thus "hear" the printed word as he hears the spoken word, and in time he will come to grasp a printed word as quickly by its sound as we who see can grasp it by its shape. Perhaps it is not impossible that some day the sounds may correspond to the actual pronunciation of the word, instead of to musical notes, but we cannot say.

The days to come will be blissful days to live in. We shall sit by the fire and talk of old times, and perhaps there may come to us, as we watch the flicker of the dying fire before we go to bed, the thought that this flickering light is a thing that has come to us from the ages before the advent of man. And perhaps, as we sit by the fire, there may come to us other visions of what yet shall be. Poets have thought and talked of the music of the spheres, and who knows that we may not hear it some day? We are finding out the power of light, and who is he who dare say that the day will not come when the stars shall be made to sing? Then, indeed, one more prophecy of Isaiah may come true, and the day come when "the mountains and the hills shall break forth into singing, and all the trees of the field shall clap their hands."

Lighthouses and Lightships. In the days when Columbus and other bold mariners set sail on uncharted seas, they were in constant peril even in European waters from shoals and submerged rocks. And when they neared strange lands, they found no warning beacons or friendly signs to mark dangerous shores or to guide their barks through difficult and winding channels into safe harbors. Today the ocean lanes are dotted with more than 13,500 lighthouses and lightships, whose powerful beacons guide the seaman as plainly as a blazed trail guides the woodman; and every harbor is marked by buoys and other signals as plainly as a city street.

If it could only speak, the lighthouse on its perilous reef, "a dim gigantic shape, holding its lantern o'er the restless surge," could tell many a thrilling tale of all that it has seen. Brave and skilful men have laid its foundations, sometimes working on half-submerged ledges buffeted by the waves, sometimes in caissons boring deep through the sand to the rock below. Read F. Hopkinson Smith's 'Caleb West', and you will see how dangerous and difficult this work is. It often takes a whole year just to drill a few holes in the rock or to lay a single stone!

The lighthouse has also seen many patient and plucky keepers who have faced countless dangers of storms, of shifting sands, of oil explosions, and of the every-hungry sea that tries to undermine the tower; and in the face of these dangers they have performed many heroic deeds. We have all heard of Grace Darling (1815–1842), the English lightkeeper's daughter, and how she and her father saved nine exhausted survivors of the *Forfarshire* after hours of battling with the waves in the teeth of a hurricane. The story of her heroism spread far and wide and honors and presents were heaped upon her. But perhaps you have not heard of the old woman lightkeeper of San Francisco Bay, who when the fog-signal was disabled stood on an exposed platform for 20 hours and struck the bell by hand. And you may not know of 70-year-old Mrs. Kate Walker, who for many years tended the light at Robbins Reef in New York harbor, and who has to her credit the rescue of about 50 persons from death in the waves.

A GUIDE FOR SHIPS IN OLDEN DAYS



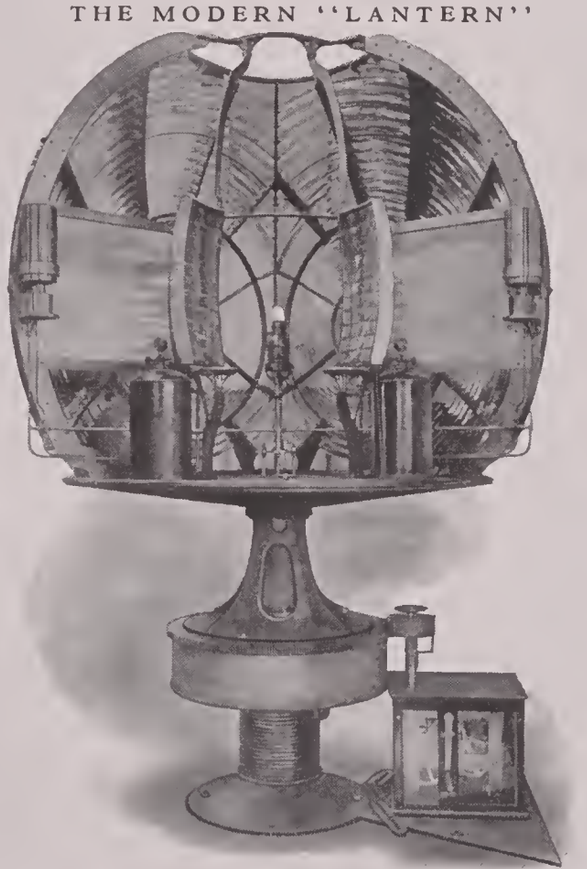
Crude as it appears to us, this lighthouse did its work faithfully at Boulogne in France for 1,400 years after it was built by the Romans. The powerful flashing lights we use were unknown in those days, of course, and the warning light was furnished by bonfires, but even such a signal was a tremendous improvement upon groping blindly through a stormy night. The picture is taken from an old print of the famous structure.

Until recent years lighthouses were huge piles of masonry of great thickness to withstand the buffeting of wave and wind. Today the typical lighthouse is a tapering cylindrical steel tower from 100 to 400 feet high, bolted into the solid rock of a reef or into a masonry foundation. A winding staircase within leads up to the gigantic lantern at the top, whose blinding shaft of light may be seen from the deck of a vessel 20 miles away or more at sea.

The lantern consists of from two to eight lenses held by a light metallic frame, with reflectors, lenses, and prisms which concentrate the light and throw it out. It is usually set in a revolving carriage moved by clockwork, so as to show a regular series of flashes by which one lighthouse may be distinguished from another. The light itself, which in olden days was made by means of coal fires, candles, and whale oil lamps, is today produced by big lamps burning vaporized kerosene, by acetylene, or by electricity.

In the earliest lighthouses, centuries before the Christian era, the light came from a brazier of burning coals hung from a pole. As far back as the 7th century B.C. there was a lighthouse at Cape Sigeum on the Asiatic side of the Dardanelles. The most famous lighthouse of antiquity was the tower built on the island of Pharos in the bay of Alexandria in the 3d century B.C. This was considered one of the Seven Wonders of the World, and for a long time the name "pharos" was given to all lighthouses. At Boulogne, on the French side of the English channel, the Romans built a great tower 192 feet around and 200 feet high, which guided mariners for more than 14 centuries.

THE MODERN "LANTERN"

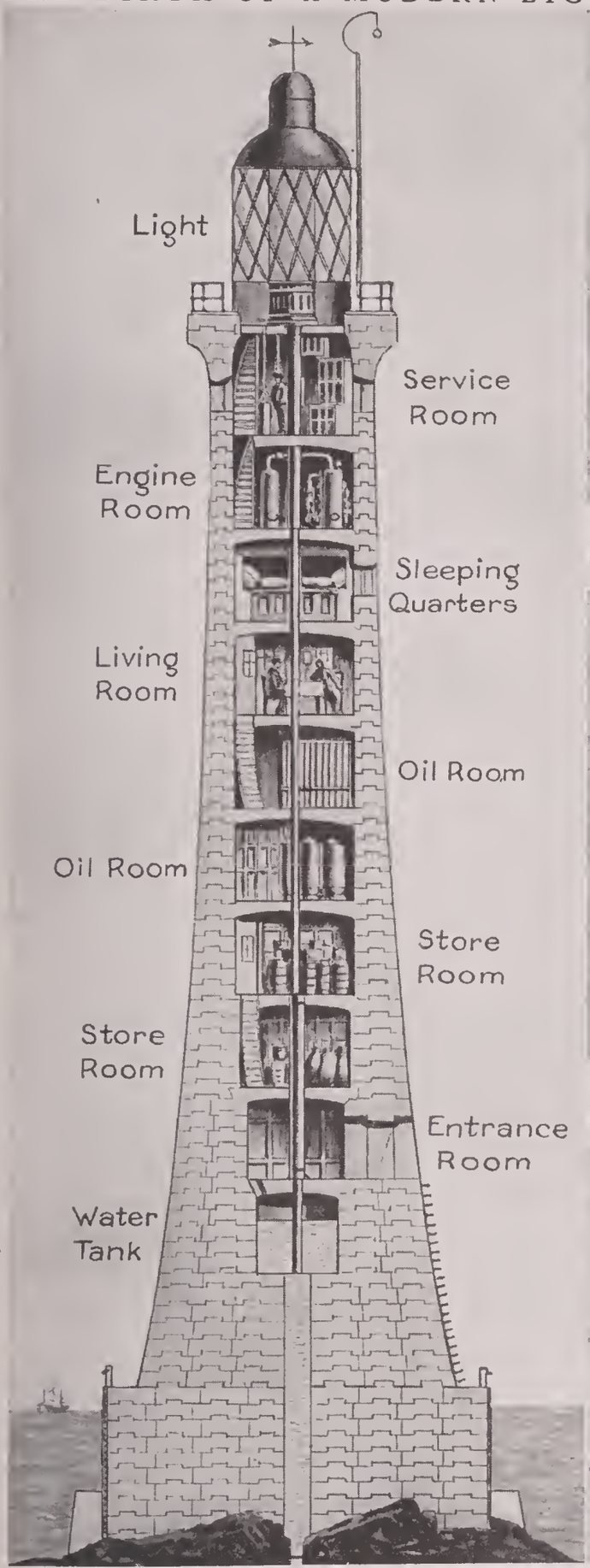


The light comes from that little acetylene-burning gas mantle in the center. Its rays are caught up and magnified by the complicated system of reflectors and lenses at the sides and shot out in horizontal beams, visible at great distances. At the lower right hand side you can see the clock-work which revolves the lantern so that its beams can be seen at regular intervals, thus enabling pilots to identify the lighthouse.

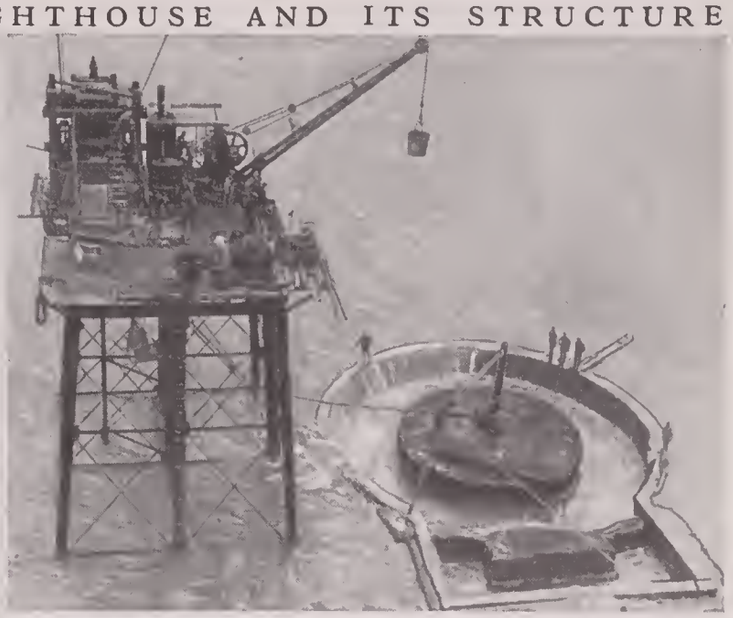
Among the most famous lights of today are the Eddystone, 13 miles off Plymouth, England, which has been rebuilt three times since 1698; the Bell Rock, off the coast of Scotland; and Minot's Ledge. The last—one of the most difficult engineering works of the world — is a dangerously placed lighthouse 20 miles southeast of Boston (*see* Boston).

Off dangerous coasts and at the entrance to harbors where lighthouses cannot be built, strong steel lightships

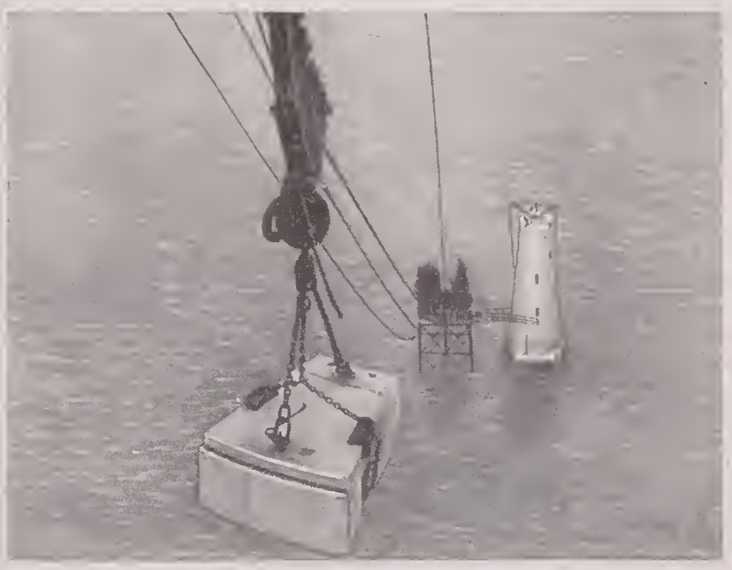
THE BIRTH OF A MODERN LIGHTHOUSE AND ITS STRUCTURE



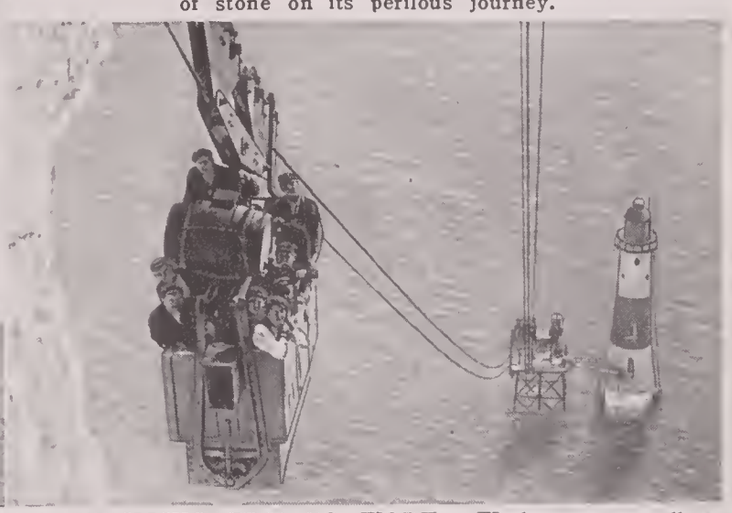
INTERIOR PLAN OF A LIGHTHOUSE. This shows you how a modern lighthouse of the stone masonry type is built. Notice how heavy the walls are at the bottom where they have to withstand the heaviest shocks.



LAYING THE FOUNDATION. This part of the work often has to be conducted from a temporary stage set up beside the lighthouse site. When the seas are rough, this work is extremely dangerous.



DELIVERING MATERIALS. Building materials for the lighthouse sometimes have to be delivered along cables, strung like giant spiders' webs from nearby cliffs. Here we see a great block of stone on its perilous journey.



A THRILLING TRIP TO WORK. Workmen as well as materials must make that dizzy trip along the cables, when such lighthouses as the Beachey Head light on the southern coast of England are being erected.

contained in the Easy Reference Fact-Index at the end of this work

are moored. They are quite different from their ancestors, the old Roman galleys with signal fires sputtering in grilled metal baskets at their mastheads. Lightships today have a single hollow steel mast, big enough to contain a ladder leading to the lantern. The United States has more than 60 of these tossing lightships, one of the most famous being the one anchored 25 miles off Nantucket, guarding the dangerous New South Shoal.

A ROUGH NIGHT ON THE LIGHTSHIP



For all its monotony, life on a lightship has its exciting moments, and here is one of them. A howling blizzard is sweeping over the sea, and the thick driving snow is threatening to obscure the lantern upon whose light so much depends. The light-tender turns out therefore, clad in oil-skins, mounts to the reeling platform, and with a mop keeps the lantern clear and bright, so that its light will show through the storm.

The work of lighthouses and lightships is supplemented by a great variety of other signals, including bell buoys and whistling buoys operated by the motion of the waves; acetylene buoys, which can be left unattended for many months at a time, the light being turned on and off by a sun valve; electric buoys; and spar buoys, some painted red and some black, to mark harbor channels. More than 15,000 such signals—lighted and unlighted—are maintained by the United States, stretching in a perfect chain around the coasts of the country wherever there is need for them. The United States lighthouses and signals are in charge of the Bureau of Lighthouses of the Department of Commerce. In Canada the coast lighting is in the hands of the minister of marine.

LIGHTNING. Benjamin Franklin was the first to prove by his kite and other experiments that lightning is caused by electrical discharges between clouds, or between clouds and the earth. We know that the air and the earth's surface are charged with electricity of opposite kinds—positive and negative — and that there is a constant interchange of electricity going on between them. Ordinarily this does not manifest itself as lightning, because moist air is a fairly good conductor. When the air becomes dry, however, the interchange becomes more difficult, with the result that the air becomes heavily charged, and enormous quantities of electricity accumulate in clouds. Finally when the charge becomes so great that it can overcome the resistance of the atmosphere, the electricity leaps violently across the gap to a hilltop, church spire, house roof, or to another cloud charged with an opposite kind of electricity, and there is a great flash, like the spark that leaps between opposite poles of an electrical machine, only infinitely greater. The heat produced by the discharge causes the particles of air to expand suddenly and compress those beyond, and when the current has passed, the air contracts just as suddenly. As it rolls back from all sides to fill the partial vacuum, the inrushing air "collides" with itself, so to speak, and causes the tremendous noise we call thunder.

In the center of a great electrical storm the discharges are so numerous and frequent that the whole air seems filled with blinding flashes of light, and incessant peals of thunder crash and roar in ear-splitting volleys that seem to shake the earth. Small wonder that, for thousands of years, mankind, in ignorance of the real cause, imagined that an angry deity was hurling bolts of fire at his ungrateful creatures!

VARIOUS FASHIONS IN WHICH LIGHTNING STRIKES



The simplest "strike" consists of a straight flash from the charged cloud to the high point, as shown on the left. If there are several layers of charged clouds, the lightning may leap from one to the other, and finally to a high point, as shown in the middle picture. If the charge is heavy, one high point may be insufficient, and the lightning will leap from the cloud in great darts and jagged forks, striking several points at once.

Photographers have obtained wonderful pictures of lightning, showing us flashes of irregular wavy outline filling the heavens, often branching into a multitude of ramifications like the limbs of a tree. Sometimes the flash descends to the earth in long spirals or ribbons, sometimes in a thick mass of strands like an unraveled rope. Such flashes are called *chain, forked,* or *zigzag* lightning. *Sheet* or *heat* lightning is a sudden glow on the horizon, and is usually merely the reflection of distant chain lightning. A third very rare kind of lightning is *ball* lightning, which looks like a ball of fire moving slowly just above the ground; as seen at night on a spar or yard of a ship it is often called "St. Elmo's fire."

Lightning rods of iron or copper, invented by Franklin to conduct lightning harmlessly from roofs to the ground, are little used today. To be effective, a great number of metal points must be scattered over the roof, and the cost is so great in comparison with the chance of being struck by lightning that they are rarely erected except on farm buildings, which the larger insurance companies today usually refuse to insure. The lofty office buildings in cities are often struck, but with little damage, for the steel skeletons about which they are erected serve as gigantic lightning rods to conduct the current harmlessly to earth. Ships usually escape damage because the masts and iron stays act as lightning rods.

TERRIFIC FLAMES THAT LIGHT THE SKY



Here is a magnificent display of forked lightning, sufficient for the flickering instant it lasts to turn night into day. A display like this requires an electric power almost beyond measurement, if we compare it to the artificial electricity we make for our use.

Lilac. Each spring the lilacs, with their wealth of fragrant pinkish purple or delicate white blossoms, aid in giving a festive air to the lawns and parks of the north temperate countries. This hardy shrub, a native of eastern Europe and Asia, was carried by European colonists to northeastern America and is now effectively used in all northern and middle states in masses of shrubbery, in hedges, and as single tree-like bushes growing to a height of 10 to 25 feet. Its popularity is due to its beauty, fragrance, early flowering, hardiness, rapid development, and easy cultivation. The shrub grows freely and flowers profusely, but may become choked with suckers growing from the base unless these are constantly cut away. The suckers, however, offer an easy means of propagation to the lilac.

THE LILAC'S CLUSTERED BLOSSOMS



The lilac combines its blossoms into clusters so they may attract insects more effectively.

Family name, *Oleaceae*; genus, *Syringa* (meaning tube or pipe, applied because the stems were once used for pipestems). Species best known in America, common lilac (*Syringa vulgaris*) with purple flowers; Persian lilac (*Syringa persica*), a smaller shrub with dainty white flowers. Beautiful double varieties are frequently found in cultivation. Leaves opposite, generally entire; flowers large erect panicles of small regular flowers with bell-shaped calyx, 4-lobed cylindrical corolla, and 2 stamens attached to mouth of tube.

Lille (*lēl*), **France.** In 1914 when the Germans entered Lille, the largest and most prosperous city of northern France, on the Deule River, seven miles from the Belgian frontier, they found a modern city of more than 220,000 inhabitants, noted for its thriving textile and iron manufactures, its historic old churches, its Palais des Beaux Arts, one of the richest picture galleries in France, and its wonderful library, containing thousands upon thousands of rare editions and original historical documents.

For the next four years it led a miserable existence—this conquered city of wide tree-lined avenues and flowering squares, fringed by handsome buildings and residences, in a region marked by forests of tall smokestacks and quaint windmills, crisscrossed by canals and busy railways. The city was put on almost starvation rations, enormous tribute of money was levied, and—worst of all—thousands of young women, old men, and boys were forcibly deported into practical slavery, to work for the German enemy. Buildings were ruined by shells, homes went up in flames, and valuable machinery in the city's famous mills, which made the locality one of the busiest manufacturing regions in Europe, was carried off to Germany.

For centuries Lille has been noted for the making of fine linen, linen and damask cloths, and flax thread for lace-making and for sewing; "lisle" thread indeed gets its name from the city. Cotton manufactures are also important as is the making of ribbons and velvet. The city also has locomotive and bridge building works, and manufactures beet sugar, chemicals, tobacco, soap, etc. Among its educational institutions is Lille University where the great Louis Pasteur was teaching when he did so much to revolutionize science and to aid agriculture and industry.

Lille's history has been a stormy one. In the 12th century it was one of the principal commercial cities of Flanders, and in the next century suffered in the struggles between the Flemish count and the French crown. As a Burgundian possession it again became prosperous. After passing into the hands of Spain, it was recovered in 1667 by Louis XIV of France. In the War of the Spanish Succession it was taken by Marlborough and Prince Eugene, but the Treaty of Utrecht restored it to France. In 1792, although the Austrians bombarded it continuously for nine days and nights, they were unable to conquer the city.

Lily. The white lily stands for purity, and artists for centuries have pictured the angel Gabriel coming to the Virgin Mary with a spray of lilies in his hand, to announce that she is to be the mother of the Christ-child. The lily is also the sign of the Resurrection and as such is the Easter flower. In Bermuda great fields of shining lilies are grown for shipment to the United States to adorn our churches at Easter time. In vivid contrast to the fair white lilies are the many brightly colored varieties, more gorgeously arrayed in their vivid crimson, scarlet, orange, or golden tints than "Solomon in all his glory."

The several hundred species of lilies grow only in the Northern Hemisphere, and most of them are confined to the temperate zone. Most popular of all is the lovely white Madonna lily, which grows wild in southern Europe and is hardy enough to thrive in the gardens of this country. This was long used as the Easter lily, but since its flowers often failed to appear in time for Easter, its place has been taken by the Bermuda lily. This can be relied on to bloom early in the spring in its native island or in hothouses in the colder climates of Europe and America.

For any subject not found in its alphabetical place see information

Among the commoner varieties of colored lilies are the tiger lily, a native of Japan, which bears dark-red purplish-spotted flowers; the Siberian coral lily, which has brilliant scarlet flowers; the gold-banded or Japan lily, with yellow-banded purple-spotted white flowers; and the showy lily, also a Japanese species, with red-dotted pinkish flowers. The giant lily of India, which has huge funnel-shaped purple-stained flowers, grows from 10 to 14 feet high, while the other species range from 2 to 5 feet. Wild lilies of the United States are the orange-red Turk's cap, the wild yellow lily, and the southern red lily.

The lily family (*Liliaceae*) is one of the most important orders of plants, since so many of its members, including asparagus, onion, leek, garlic, chives, etc., are used for food. Some of the garden flowers of this family are the lily of the valley, tulip, hyacinth, and tuberose.

THE "TURK'S CAP" LILY



This orange-red flower is one of the common wild lilies of the United States.

The lily genus (*Lilium*) is marked by an erect stem, narrow sessile leaves, alternate, scattered, or whorled, and large showy bell-shaped or trumpet-shaped 6-parted flowers, enclosing 6 stamens and a seed-vessel. The beautiful white calla lily or arum lily (*Richardia aethiopica*) with its brilliant yellow spadix, belongs to an entirely unrelated genus. Many other so-called lilies, as the water lilies, belong to the Iris or Amaryllis groups. Scientific name of the Madonna lily, *Lilium candidum;* of Bermuda or Easter lily, *Lilium longiflorum.*

THE LILY OF THE VALLEY



Lily of the valley. Nestling among the broad cool leaves, the dainty white bells of the lily of the valley sway back and forth, wafting to the breezes their delicate perfume. This well known plant is native to Europe, Asia, and America, growing in shady damp spots and blossoming in the spring months. The smooth, linear-shaped leaves rise directly from the roots and in their midst the 6-toothed bells nod on their slender green stems. There are few plants more satisfactory than the lily of the valley. It is cultivated in hothouses throughout the year, and when planted in our gardens, it soon escapes and runs wild along shady roadsides, its graceful "bells" nodding in the breeze. Scientific name, *Convallaria majalis.*

Lima, Peru. In Lima, the magnificent capital city of Peru, a rain storm is as much feared as an earthquake. For the houses, with walls of adobe four to six feet thick, are almost earthquake proof, and rarely take fire, but a heavy deluge would reduce most of the town to a mud heap. It is fortunate indeed that almost from year's end to year's end the city is without rain.

There are several handsome promenades in the city, and numerous public squares. On one stands the cathedral—the finest of the 70 churches in Lima, and one of the most noteworthy in Spanish America—with a beautiful Moorish façade and two lofty towers. The larger houses are made picturesque by lattice-inclosed balconies from whose shelter the women look out on the busy street life. The roofs are always flat, and since there are no gardens and few backyards they are used by the common people as barnyards. In some cases a cow may spend all her life on the roof of her owner's residence.

Lima lies in a broad valley, six miles east of Callao, its port, with which it is connected by two railroads. Earthquakes have been frequent and disastrous, and the dense fogs which prevail in winter render the climate uncomfortable and at times unhealthy. At the city is the national university of San Marcos—the oldest in the Americas—which received its charter from Emperor Charles V in 1551. The city was founded in 1535 by Pizarro, the conqueror of Peru, whose remains lie in the crypt below the cathedral. Under Spanish rule Lima was the principal city of South America. During the Chilean occupation in 1881–83 many of its ancient monuments were destroyed. The manufacture of cotton and woolen textiles, sugar, chocolate, cigars, and cigarettes, etc., is becoming increasingly important. The name "Lima" is a corrupted pronunciation of "Rémae," the name of the river on which the city is situated. This river provides Lima with an exceptionally fine water supply. Population, about 175,000.

Lime. If you leave a hen's egg in a strong solution of vinegar for a day or so, the shell will become as soft and flexible as the egg of a turtle. This is because the acid of the vinegar dissolves the lime compound of which the shell is composed, leaving only the tough inner membrane.

Egg shells are only one of the many forms of lime which we meet with all about us. Common lime, such as is used in making plaster and mortar, is the oxide of the metallic element calcium, and its chemical formula is CaO—which means that its "molecules" are composed each of one atom of calcium united with one atom of oxygen. It is a white solid which does not fuse except at the enormous heat of the electric furnace; but when raised to a white heat by means of the oxyhydrogen flame it glows with a brilliant white light called the lime light, calcium light, or Drummond light. It is obtained by burning limestone or marble in kilns to drive out the carbon dioxide, and is frequently somewhat impure. When water is poured on quicklime, it swells to a larger bulk, and heat is given off—enough to boil water—leaving a light white powder or a moist mass, according to the amount of water used. This powder or moist mass is *slaked lime* (calcium hydroxide), a compound of lime with water. Slaked lime is only slightly soluble in water, but sufficiently so as to make an alkaline solution known as lime water. This is used as a medicine and in testing for carbon dioxide, which will make lime water cloudy and then clear up. When quicklime is exposed to the air for a long time, it takes up moisture and carbon dioxide and becomes airslaked. Lime is used in the preparation of mortars and cements, for purifying coal-gas, making paper-pulp, and for removing hair from skins in tanning. For many centuries it has been used also as a fertilizer, especially on acid soils; but finely ground limestone is often better for this purpose than lime itself. (For other compounds of calcium *see* Calcium.)

Limericks. Did you ever make a limerick? Here is a pattern limerick from Rudyard Kipling:

There was a small boy of Quebeck,
Who was buried in snow to his neck;
When they said, "Are you friz?"
He replied, "Yes I is—
But we don't call this eold in Quebeck."

Many other prominent writers have given us the same kind of nonsense verses. Edward Lear, an English artist, published a collection of hundreds of limericks, such as—

There was once a man with a beard
Who said, "It is just as I feared!—
Two owls and a hen,
Four larks and a wren
Have all built their nests in my beard."

He wrote them just to amuse some of his young friends, but when he published his collection, in 1846, it sprang into such popularity that it made him far more famous than his serious work would ever have done. Writing limericks became a favorite amusement, as it still is. Newspapers often have limerick competitions in which prizes are given for the best limerick or the best last line. Perhaps these two famous limericks of unknown authorship originated in such a competition:

There was a young lady of Niger
Who smiled as she rode on a Tiger;
They came back from the ride
With the lady inside,
And the smile on the face of the Tiger.

There was a young maid who said, "Why
Can't I look in my ear with my eye?
If I give my mind to it,
I'm sure I can do it,
You never can tell till you try."

Though it was Lear who made the limerick popular, the origin of this verse form is credited to the Irish. At Irish parties, we are told, it was once customary for each guest to make up a line of nonsense verse in this meter, and then for the whole company to join in a chorus with the words, "Will you come up to Limerick?"—the allusion being to an important port of that name on the west coast of Ireland, at the head of the estuary of the River Shannon. From this chorus, it is said, the verse received its name.

Limestone. One of the commonest and most useful rocks is limestone, which is used for building, for road-making, as a flux in smelting iron and lead ores, as an ingredient in portland cement, and, when burnt to lime, for making mortar and chloride of lime, and in the manufacture of gas, soap, sugar, etc. In the form of ground limestone or burnt or hydrated lime, it is extensively used to correct acidity of the soil. This condition, which arises when basic material has been removed by crops or drainage, is very unfavorable to many crops, and particularly to peas, beans, clover, and other legumes. Limestone not only "sweetens" the soil, but improves the texture.

Limestone is an aqueous or water-formed rock, composed chiefly of calcium carbonate ($CaCO_3$). Most limestones are built up from the calcareous remains of water creatures—shells of mollusks and foraminifera, coral skeletons, fragments of crinoids, etc.; indeed, the shells and crinoid stems are plainly to be seen in some limestones. Oölitic limestone resembles in texture fish eggs (whence its name, from the Greek), and is a highly valued building stone because of the ease with which it is worked. This is the famous Indiana or "Bedford" limestone. Other limestones, called travertine and calcareous tufa, are formed by the deposit of calcium carbonate from hard water, as stalactites and stalagmites are formed by the dripping of water in limestone caverns and as a limy crust is formed inside of a tea kettle used for hard water.

Chalk is a white soft limestone composed chiefly of the shells of foraminifera (*see* Chalk). Dolomite is a limestone which contains carbonate of magnesium as well as calcium. Marble is a metamorphic limestone which has been crystallized under pressure and probably heat (*see* Marble). There are many other useful varieties of limestone.

LIME TREE. On a hot summer day there is no more pleasant drink than a glass of cool limeade. You make it like lemonade, either by squeezing out the juice of the fresh fruit or from bottled lime juice imported from the West Indies. The lime fruit is a citrus fruit, smaller than the lemon, with a thin skin and very acid greenish pulp. It grows on a small tree rarely more than eight feet high, which is native to eastern Asia and is now cultivated in southern Europe, the West Indies, Mexico, Florida, and California. A cross or hybrid, recently produced, between the lime and the kumquat (another kind of citrus fruit), called the "limequat," is more hardy and has an abundance of very acid pulp.

In the tropics limes are used almost entirely in place of lemons and they are becoming a more important fruit every year in the United States, the main supply coming from the West Indies and from Mexico. They are too thin-skinned to keep well, however, and are therefore packed and shipped while still green. Lime juice is extensively used on shipboard for preventing scurvy, and British sailors are sometimes nicknamed "lime-juicers," because the law requires a weekly allowance of lime or lemon juice to be served to crews. Lime juice is also used extensively as a candy flavoring. Scientific name, *Citrus aurantifolia*

The name "lime tree" is also commonly applied to the linden in Europe and occasionally in America.

"NEW BIRTH *of* OUR NEW SOIL, *the* FIRST AMERICAN"

How Abraham Lincoln Rose from Obscurity to One of the Greatest Places in History—His Struggles against Early Poverty, His Fight to Preserve the Union and Free the Slave, and His Tragic End



The Beautiful Lincoln Memorial in Washington

LINCOLN, ABRAHAM (1809–1865). Nothing in the history of democracy has gone farther to justify belief in the capacity of the common people for self-government than the fact that Lincoln's great heart and brain sprang from poor unlettered ancestry and were nourished in the sterile soil of backwoods life. Lincoln was born in Hardin County, Kentucky, Feb. 12, 1809, when the pioneer era with its comparative comforts was just emerging from the Indian fighting and hunting period of Daniel Boone. His log cabin home with its dirt floor was but a grade better than an Indian lodge; his food and clothing were more often trophies of the chase than products of the soil. The school was nearly five miles distant, and the teacher was competent to teach only reading, writing, and elementary arithmetic. At 21 Lincoln possessed only six books—the Bible, 'Pilgrim's Progress', 'Aesop's Fables', 'The Arabian Nights', a life of Washington, and the statutes of Indiana. He had also, from seeing an occasional Louisville or Vincennes newspaper, committed to memory a number of Henry Clay's speeches which appeared in these publications.

The conditions of life in southern Indiana, whither the family removed in 1816, were as primitive as in Kentucky. Here, on the farm near Gentryville—now Lincoln City—near the Ohio River, Lincoln's brave young mother died for lack of medical attendance, in 1818. The boy of nine helped his father, a cabinet-maker by trade, to make the rude coffin in which his mother was buried. Then he wrote his first letter, one to a circuit-riding preacher, asking him to stop on his next round and say a prayer over her grave. To

his mother, who urged him to "learn all he could and be of some account in the world," and to his capable stepmother, with her sympathy and insight, he owed much in the shaping of his character. Honesty, loyalty, affection, willing service, and striving after every kind of good marked the 21 years he spent under his father's various roofs. For good measure he added six months to help the family establish themselves in the new home on Sangamon River, Illinois, in 1830. He helped build the cabin, cleared land for corn, and split walnut rails to fence the clearing. Thirty years later some of those rails, carried into the convention at Chicago by John Hanks, his relative, helped win for him the nomination for the presidency. Little he thought of such a thing when, in the autumn of 1830, he tied his extra shirts and home-knit socks in a big cotton handkerchief, and turned his face to the nearest settlement of New Salem—to begin life as a man.

He made two voyages on flatboats to New Orleans; served as captain of the Clary's Grove boys, a company of volunteers in the Black Hawk War; clerked in a store; acted as village postmaster, carrying all the mail in his hat; and learned surveying. As a trader he was a failure, but his moral, social, and mental gifts made him a leader. In 1834 he was chosen by the Whigs of his district to represent them in the legislature. Self-educated, he passed the examination for admission to practice law in 1837. When Springfield became the capital of Illinois in 1837, he removed to that city, and in 1842 refused to serve further in the legislature. All his time was needed to attend to his growing practice. In 1846 he served one term in Congress, but the administration was Democratic and he was a Whig, so there was little chance to distinguish himself. From 1848 to 1854 Lincoln was out of politics, but he was making a reputation as a lawyer and as an orator. The passage of the Kansas-Nebraska bill prepared by Stephen A. Douglas, Democratic senator from Illinois, alarmed the Whigs of the North to vigorous resistance against the threatened spread of slavery. Lincoln soon became the leader of the opposition in the West. He returned to the Illinois legislature and helped organize the new Republican party. In the first national convention of the Republicans his name was presented by the Illinois delegation as its candidate for the vice-presidency. In 1858 his fame became national through his contest with Douglas for the United States senatorship, in the course of which occurred the famous Lincoln-Douglas series of debates.

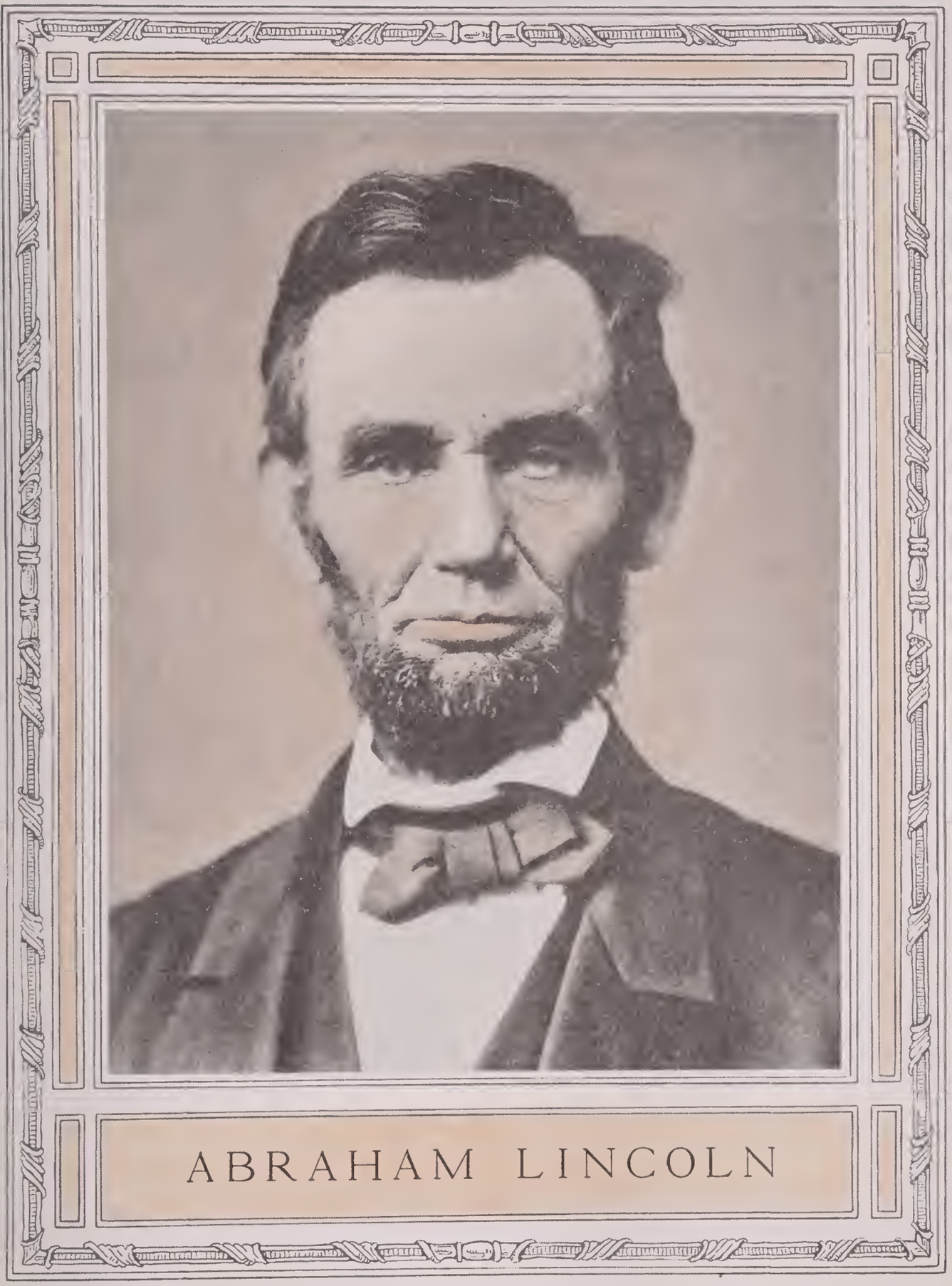
In his speech in the Republican state convention that summer, Lincoln had made an observation that set the nation to thinking. "A house divided against itself," said he, "cannot stand. I believe this government cannot endure permanently half slave and half free." In the seven public debates in various parts of Illinois between Lincoln and Douglas, which now followed, Lincoln proved superior to his opponent, who had been looked upon as probably the next president. Douglas was returned to the national Senate by a lessened majority, and admissions had been forced from him that killed his popularity in the South and his chances for the presidency. In May 1860 the Republican National Convention at Chicago nominated Lincoln for president with Hannibal Hamlin of Maine as vice-president. In the election the Democratic vote was divided between Douglas and Breckinridge; but their united vote would not have defeated Lincoln and Hamlin, who had 180 votes in the electoral college against a total of 123 for all other candidates.

Lincoln was not pledged to abolish slavery,—only to preserve the Union and to prevent the spread of slavery. Even after the war began, the government offered to purchase the freedom of slaves in the slave states that remained loyal—Kentucky, West Virginia, and Missouri. But the secession movement began as soon as Lincoln's election, in November 1860, was assured. When his inauguration took place, on March 4, 1861, seven states had seceded and formed the Confederate Government. In his inaugural address he declared that the Federal government

ADMINISTRATIONS OF ABRAHAM LINCOLN

1861-1865

Fort Sumter fired on and Civil War begun (April 12, 1861).
Lincoln calls for troops (April 15).
Union defeat at Bull Run (July 21).
'Trent' Affair (Nov. 8) threatens war with England.
'Monitor' and 'Merrimac' engagement (March 9, 1862).
Grant's victory at Shiloh (April 6–7).
Slavery abolished in District of Columbia (April 16).
New Orleans taken by Farragut (April 25).
McClellan's Peninsular Campaign (March to July).
Lincoln attacked for repressive measures.
Democrats gain in Congressional elections.
Emancipation Proclamation (Jan. 1, 1863).
West Virginia admitted as a State (June 20).
Lee defeated at Gettysburg (July 1–3).
Vicksburg taken by Grant (July 4).
Draft riots in New York City (July).
Grant made commander-in-chief (March 12, 1864).
Sheridan wastes Shenandoah Valley (October).
Sherman's march through Georgia to the Sea (November-December).
Nevada admitted as a State (Oct. 31).
Lincoln reëlected (Nov. 8) against McClellan.
Lee surrenders at Appomattox (April 9, 1865).
Lincoln shot (April 14).



ABRAHAM LINCOLN

would not attack the rebellious states, but that it would "defend, protect, and preserve if attacked." A month later Fort Sumter was bombarded and captured by the Confederates. The president mobilized the regular army and issued a call for volunteers. Within a month all the states had arrayed themselves on one side or the other, and the four years' Civil War was begun. The conduct and results of this war are set forth in every school history. Separate sketches of the commanders who distinguished themselves are to be found elsewhere in this work.

Lincoln's part was to guide the ship of state through the troubled waters of civil war. For two years he kept consistently to the task of preserving the Union. On Jan. 1, 1863, he issued the Emancipation Proclamation, and from that on the prosecution of the war had the added purpose of freeing the slaves. Never has the world seen a greater example of wisdom, patience, patriotism, and moral courage than animated his every act. The battle of Gettysburg was fought in July 1863. In the following November the battlefield was dedicated as a national cemetery. Lincoln's brief speech on that occasion will ever remain one of the greatest speeches ever uttered, both for its lofty sentiment and for its matchless literary style. It is said that this immortal speech was so quickly uttered, so unexpectedly brief, that those who heard it did not realize their privilege until they saw it in print. Then it was understood that the country had in its president one of the greatest leaders of all time, and an unsurpassed master of vigorous, simple, and convincing expression.

LINCOLN'S GETTYSBURG ADDRESS

FOURSCORE · AND · SEVEN · YEARS · AGO · OUR · FATHERS BROUGHT · FORTH · UPON · THIS · CONTINENT · A · NEW NATION, · CONCEIVED · IN · LIBERTY · AND · DEDICATED · TO THE · PROPOSITION · THAT · ALL · MEN · ARE · CREATED EQUAL. ✣ NOW · WE · ARE · ENGAGED · IN · A · GREAT · CIVIL WAR, · TESTING · WHETHER · THAT · NATION · OR · ANY · NATION · SO · CONCEIVED · AND · DEDICATED, · CAN · LONG ENDURE. ✣ WE · ARE · MET · ON · A · GREAT · BATTLE-FIELD OF · THAT · WAR. ✣ WE · HAVE · COME · TO · DEDICATE · A · PORTION · OF · THAT · FIELD · AS · A · FINAL · RESTING-PLACE FOR · THOSE · WHO · HERE · GAVE · THEIR · LIVES · THAT · THAT NATION · MIGHT · LIVE. ✣ IT · IS · ALTOGETHER · FITTING AND · PROPER · THAT · WE · SHOULD · DO · THIS. ✣ BUT · IN · A LARGER · SENSE · WE · CANNOT · DEDICATE, · WE · CANNOT CONSECRATE, · WE · CANNOT · HALLOW, · THIS · GROUND. ✣ THE · BRAVE · MEN, · LIVING · AND · DEAD, · WHO · STRUGGLED · HERE · HAVE · CONSECRATED · IT · FAR · ABOVE · OUR POWER · TO · ADD · OR · DETRACT. ✣ THE · WORLD · WILL LITTLE · NOTE · NOR · LONG · REMEMBER · WHAT · WE · SAY HERE, · BUT · IT · CAN · NEVER · FORGET · WHAT · THEY · DID HERE. ✣ IT · IS · FOR · US, · THE · LIVING, · RATHER · TO · BE DEDICATED · HERE · TO · THE · UNFINISHED · WORK · WHICH THEY · WHO · FOUGHT · HERE · HAVE · THUS · FAR · SO · NOBLY ADVANCED. ✣ IT · IS · RATHER · FOR · US · TO · BE · HERE DEDICATED · TO · THE · GREAT · TASK · REMAINING · BEFORE US, · THAT · FROM · THESE · HONORED · DEAD · WE · TAKE INCREASED · DEVOTION · TO · THAT · CAUSE · FOR · WHICH THEY · GAVE · THE · LAST · FULL · MEASURE · OF · DEVOTION; THAT · WE · HERE · HIGHLY · RESOLVE · THAT · THESE · DEAD SHALL · NOT · HAVE · DIED · IN · VAIN; · THAT · THIS · NATION, UNDER · GOD, · SHALL · HAVE · A · NEW · BIRTH · OF · FREEDOM, · AND · THAT · GOVERNMENT · OF · THE · PEOPLE, · BY THE · PEOPLE, · AND · FOR · THE · PEOPLE · SHALL · NOT PERISH · FROM · THE · EARTH.

At the Gettysburg dedication Edward Everett, one of the greatest of American public speakers, gave the principal address, and held his hearers spellbound by his brilliant oratory. President Lincoln followed, reading simply and unpretendingly to the tired and restless audience what was supposed to be a perfunctory utterance. Few persons heard what he said, and almost no one realized, until the address appeared in the papers next morning, that they had been listening to one of the world's masterpieces in literature. Then Mr. Everett wrote to the President, saying: "I should be glad if I could flatter myself that I came as near to the central idea of the occasion in two hours as you did in two minutes."

Love, reverence, and gratitude were in the votes by which Lincoln was reelected in 1864, with Andrew Johnson of Tennessee as vice president; but he was also assailed by partisan opponents almost as bitterly as Washington had been during the latter's second administration. But Lincoln, the union candidate, received 212 electoral votes, to 21 cast for his Democratic rival, Gen. George B. McClellan, who ran on a peace platform that declared the war a failure. In his second inaugural address, delivered six weeks before he was assassinated, President Lincoln set forth the moral significance of the conflict then drawing to a close, and declared that the task would be finished "with malice toward none, with charity for all."

On April 14, five days after Lee's surrender, President Lincoln was shot by John Wilkes Booth, an actor, at Ford's Theater in Washington, as part of a general plot against the government. He died the next morning without recovering consciousness. The nation hopes never again to see such a pageant of mourning as marked the progress of his funeral train to Springfield, Ill., where he was laid away in the sweet spring weather. A noble monument marks his resting place. On the one hundredth anniversary of his birth, Feb. 12, 1909, the Lincoln Farm Association dedicated a memorial museum, erected at a cost of $250,000 on the site where he was born. The weatherworn log cabin which was his first home is reverently preserved within this marble temple.

In statue, bust, and portrait we have all been made familiar with Lincoln's tall spare figure, strong fea-

INCIDENTS IN LINCOLN'S CONDUCT OF THE CIVIL WAR



The figure of Lincoln is easily recognized in this historic photograph showing him among the generals of the Army of the Potomac, shortly after the battle of Antietam. Lincoln's handling of army problems provided an example of fine executive ability. He made it his business to become intimately acquainted with the army leaders, visiting them in the field as often as possible. Although the keenest of his many disappointments was the failure of one after another of his appointees to military commands, he was always slow to condemn, waiting until repeated disasters proved their incompetency before removing them. In working with these ambitious and many times overbearing men, he displayed rare patience and lack of self-consideration. Nothing was too big or too little for him to do to help them. When friends remonstrated against McClellan's inconsiderate treatment of him, Lincoln quietly replied, "I would hold McClellan's horse if that would bring us victories."



Here President Lincoln is shown reading the Emancipation Proclamation to the members of his cabinet. We see, from left to right: Stanton, Chase, the President, Welles, Smith (standing), Seward (seated), Blair, and Bates. Not the least of Lincoln's troubles in conducting the war was the fact that his Cabinet was often divided, and that for some time many of its members thought themselves better equipped than the President to handle the big questions of the day. Continued experience with his leadership won them over, however, and at the end he had no warmer admirers than the men who once had been the most severe of critics. The historic conference shown above took place on Sept. 20, 1862.

contained in the Easy Reference Fact-Index at the end of this work

tures, heavy black hair, and deep-set gray eyes. We are equally familiar with his simple, friendly manner, his humor, his illuminating anecdotes, his tolerance, and the wistful expression he often wore as if he had missed his share of happiness. In speech he was plain and forcible, often dramatic; in mind he had quick perception, logical analysis, sagacity, a tenacious memory, intuitive knowledge of character, and broadminded philosophy. The judgment of the years has but confirmed the tribute of Stanton to his dead chief: "There lies the most perfect ruler of men the world has ever seen." He had the brain of a sage, the foresight of a prophet, the inflexible purpose of the historic reformers, and the tender heart of a mother. He is his country's most poignant and admonishing memory. It rests with us to breed such wise, gentle, and consecrated souls that the nation, which he lived and died to save, may deserve not to perish from the earth.

Nicolay and Hay's 'Life of Abraham Lincoln' in 10 volumes, is encyclopedic in information. The biography by Ida M. Tarbell, in 4 volumes, contains much new material. Lord Charnwood's 'Lincoln' is the best one-volume biography. Rothschild's 'Lincoln, Master of Men,' is thoroughly worth while. For the young reader the best work is perhaps Helen Nicolay's 'The Boy's Life of Lincoln'. Every library contains a collection of Lincoln books, covering every phase of his life.

Some Stories of Lincoln

LINCOLN AND THE SLEEPING SENTINEL

IN a regiment that guarded a road to Washington, in the first year of the Civil War, was a farmer boy, William Scott, a volunteer from the Green Mountains of Vermont. One morning he was found asleep at his sentry post. He had taken the place of a sick comrade and had been on continuous duty thirty-six hours. He was tried and condemned to be shot under the stern provisions of the military law covering such cases.

When the War Department refused to set aside the sentence of the court-martial, the captain of the boy's company rushed to the White House and told the story to President Lincoln. He declared that, if anyone, he was the person who should be shot, for it was he who had kept that brave and faithful soldier on duty for so many hours and was therefore morally responsible for the soldier's offense. Mr. Lincoln rode out to the camp, inquired into the circumstances, and within an hour, by means of executive pardon, had restored William Scott to his regiment.

Six months later William Scott died a hero's death. In the lost battle of Lee's Mill, he was the last to retreat from a field on which half his company had fallen. He bore a wounded officer to safety, and then returned twice, under fire, and saved two more comrades from capture. But he himself fell mortally wounded, and was carried to the rear. Before he died he wanted President Lincoln to know that he had served his country faithfully.

"Tell him I tried to be a good soldier—true to the flag. Thank him for giving me the chance to die in battle, and not like a coward at the hands of my comrades."

"Goodbye, boys," he added cheerily, after a time. With a smile on his brave young lips, he fell into eternal sleep.

LINCOLN'S LETTER TO MRS. BIXBY

THE short letter which Lincoln wrote to Mrs. Bixby of Boston, on learning that all of her five sons had been killed in battle in the Civil War, is so tender in sentiment, so exalted in spirit, and so perfect in form, that it will live as long as his Gettysburg Address:

"EXECUTIVE MANSION, WASHINGTON, D.C.
"November 21, 1864.

"DEAR MADAM: I have been shown in the files of the War Department a statement of the Adjutant General of Massachusetts that you are the mother of five sons who have died gloriously on the field of battle.

"I feel how weak and fruitless must be any words of mine which should attempt to beguile you from the grief of a loss so overwhelming. But I cannot refrain from tendering you the consolation that may be found in the thanks of the Republic they died to save. I pray that our Heavenly Father may assuage the anguish of your bereavement, and leave you only the cherished memory of the loved and lost, and the solemn pride that must be yours, to have laid so costly a sacrifice upon the altar of freedom.

"Yours very Sincerely and Respectfully,
"ABRAHAM LINCOLN."

LINCOLN'S DOG STORY

IN defending a man charged with assault and battery, Lincoln won the case by telling a dog story, after the testimony had clearly proved that the plaintiff, although getting the worst of it in the end, had started the fight.

"But your client could have protected himself without half-killing mine," retorted the lawyer who was opposing Lincoln.

"That reminds me of a story," said Lincoln. "A man who was attacked by a farmer's vicious dog killed the brute with a pitchfork.

" 'Why did you kill my dog? Why didn't you defend yourself with the other end of the pitchfork?' demanded the angry farmer.

" 'Well, why didn't the dog come at me with his other end?' "

VALUABLE ADVICE FOR NOTHING

THE meanest man in Springfield once tried to engage Lincoln's services in a lawsuit for a sum of money. After examining the evidence and inquiring into the circumstances of the alleged debtor, Lincoln said: "I could win this case for you if I were in this sort of business. I will just give you some advice for nothing. You seem to be an able, energetic man. Try your hand at making that $600 in some other way, rather than taking it from a poor widow with five children."

LOWELL'S TRIBUTE TO LINCOLN

From his Commemoration Ode, read July 21, 1865, in honor of the Harvard dead in the Civil War

Such was he, our Martyr-Chief,
Whom late the Nation he had led,
With ashes on her head,
Wept with the passion of an angry grief:
Forgive me, if from present things I turn
To speak what in my heart will beat and burn,
And hang my wreath on his world-honored urn.
Nature, they say, doth dote,
And cannot make a man
Save on some worn-out plan,
Repeating us by rote:
For him her Old-World moulds aside she threw,
And, choosing sweet clay from the breast
Of the unexhausted West,
With stuff untainted shaped a hero new,
Wise, steadfast in the strength of God, and true.
How beautiful to see
Once more a shepherd of mankind indeed,
Who loved his charge, but never loved to lead;
One whose meek flock the people joyed to be,
Not lured by any cheat of birth,
But by his clear-grained human worth,
And brave old wisdom of sincerity!
They knew that outward grace is dust;
They could not choose but trust
In that sure-footed mind's unfaltering skill,
And supple-tempered will
That bent like perfect steel to spring again and thrust.
His was no lonely mountain-peak of mind,
Thrusting to thin air o'er our cloudy bars,
A sea-mark now, now lost in vapors blind;
Broad prairie rather, genial, level-lined,
Fruitful and friendly for all human kind,
Yet also nigh to heaven and loved of loftiest stars.
Nothing of Europe here,
Or, then, of Europe fronting mornward still,
Ere any names of Serf and Peer
Could Nature's equal scheme deface
And thwart her genial will;
Here was a type of the true elder race,
And one of Plutarch's men talked with us face to face.
I praise him not; it were too late;
And some innative weakness there must be
In him who condescends to victory
Such as the Present gives, and cannot wait,
Safe in himself as in a fate.
So always firmly he:
He knew to bide his time,
And can his fame abide,
Still patient in his simple faith sublime,
Till the wise years decide.
Great captains, with their guns and drums,
Disturb our judgment for the hour,
But at last silence comes;
These all are gone, and, standing like a tower,
Our children shall behold his fame.
The kindly-earnest, brave, foreseeing man,
Sagacious, patient, dreading praise, not blame,
New birth of our new soil,
The first American.

LINCOLN-DOUGLAS DEBATES. On July 24, 1858, Abraham Lincoln challenged Senator Stephen A. Douglas to a series of joint debates during the campaign for the election of members of the Illinois State Legislature, which in turn was to elect a United States senator for Illinois. Douglas, a Democrat, was seeking reëlection and Lincoln was the candidate of the Republicans.

Douglas accepted Lincoln's challenge, and there followed a series of meetings, described by Lincoln in a meeting at Quincy as "the successive acts of a drama to be enacted not merely in the face of audiences like this, but in the face of the nation and, to some extent, in the face of the world."

They were both skilled campaigners on the stump. Douglas was the better known, but Lincoln's tall, gaunt figure was not unfamiliar. Douglas, who was a railroad attorney, had a special train when necessary. Lincoln made his way to the appointed places as best he could, sometimes on a freight that had to pull out for Douglas' special train. In all of the debates, held at Ottawa, Freeport, Jonesboro, Charleston, Galesburg, Quincy, and Alton, Lincoln's clearness, force, and moral earnestness proved more than a match for Douglas' plausible oratory and the cleverly managed machinery of the Democratic campaign.

It was the debate at Freeport, however, which won the most fame. In that debate Lincoln, disregarding the protests of his friends, asked Douglas if the people of a territory could exclude slavery from its limits before the formation of a state constitution. This question placed Douglas where he could not dodge the main issue. According to his own doctrine of popular sovereignty the people could prohibit slavery in the territory, but according to the Dred Scot Decision, to which he had given his approval, they could not do so. If he upheld the popular sovereignty doctrine, he would displease the people of the South, who were not happy over its application in Kansas and Nebraska. If he supported the Dred Scot Decision, he would lose his following among the people of the North. Douglas stood for his popular sovereignty doctrine, as Lincoln had expected that he would, and declared that a territory could "by unfriendly legislation" keep out slavery. This "Freeport Doctrine" alienated the South, and cost Douglas the presidency in 1860, as Lincoln had forseen it would when he asked the question.

contained in the Easy Reference Fact-Index at the end of this work

When the results of the election of 1858 became known, it was found that, though Lincoln had a majority of the popular votes of the state, Douglas had won the senatorship owing to the way the legislative districts had been gerrymandered. The result was a great disappointment to Lincoln who declared that he was "like the boy who stumped his toe. It hurt too bad to laugh and he was too big to cry."

Linden. There are about twelve species of the linden tree distributed throughout the north temperate regions, three well-known species occurring in North America. The American linden, often known as the bass-wood or whitewood, is a large tree attaining a height of 125 feet. The form is softly rounded, tapering slightly at the top, and the tree is clothed with an abundance of heart-shaped glossy foliage. In May and June it bears fragrant cream-colored blossoms. When these fall their place is taken by downy, round, greenish-gray fruit. The tree thrives in rich woods and river bottoms from Canada south to Georgia and westward. The wood is highly valued for cabinet work and is used extensively for woodenware. The southern whitewood or bass-wood is a much smaller tree than its northern cousin, seldom attaining more than 50 feet in height. It thrives in the moist woods from Long Island to Florida and westward. Another species which attains a height of about 70 feet is known as the white bass-wood or linden bee-tree. It is a very beautiful tree with small, fluttering foliage, and grows best in Tennessee.

The European linden (often called the "lime tree") is cultivated extensively as a shade tree in the Old World, though it lacks the size and beautiful round form of the American species. It has given its name to the famous Berlin street, *Unter den Linden.*

Scientific name of American linden, *Tilia americana.* Bark dark brown, deep vertical ridges, separating into thin scales. Leaves 4 to 5 inches long, rounded in outline, conspicuously pointed at apex, dark green, smooth and glossy. Flowers cream-colored, fragrant, growing in cymes under the leaves. Fruit greenish-gray, round, downy, resembling small peas when young; contains 10 seeds.

Linen. "Purple and fine linen" was the raiment of princes in Biblical days, and fine linen is a luxury still. The glossy luster of fine table damask rivals silk brocade. The snowy whiteness of bleached linen and its smooth dirt-repelling surface make it the preferred material for shirts, collars, and handkerchiefs. Because linen is an excellent conductor of heat, linen sheets and garments are delightfully cool for summer. Linen towels are preferable to cotton because they absorb moisture more readily. Its great tensile strength makes linen desirable for airplane cloth at one end of the scale and the most delicate hand-made laces at the other. Heirlooms of lace and table linen, as well as Egyptian mummy cloths, attest the durability of linen.

On the other hand, linen takes dyes less readily than silk, cotton, or wool, and fades more easily. It is more difficult to weave than cotton, because it is less elastic and the threads break more readily.

The processes by which linen is made from the flax fiber are described in the article on Flax. Formerly linen was often woven with wool to make "linsey-woolsey," largely used for dresses of pioneer women. The finest lace threads are still spun by hand, and it is said that the finest are spun in damp cellars, the spinner making, by touch alone, a thread too fine to be seen.

The quickest test for the purity of linen, and the one which, though not infallible, is generally employed, is the touch of the moistened finger; if the moisture comes through slowly, the fabric is probably part cotton. Another test is to set a thread on fire; cotton will blaze, while linen will smolder. The surest method is first to boil all the dressing out of a sample and then put it in a 50 per cent solution of caustic soda; this will turn cotton light yellow and linen almost brown.

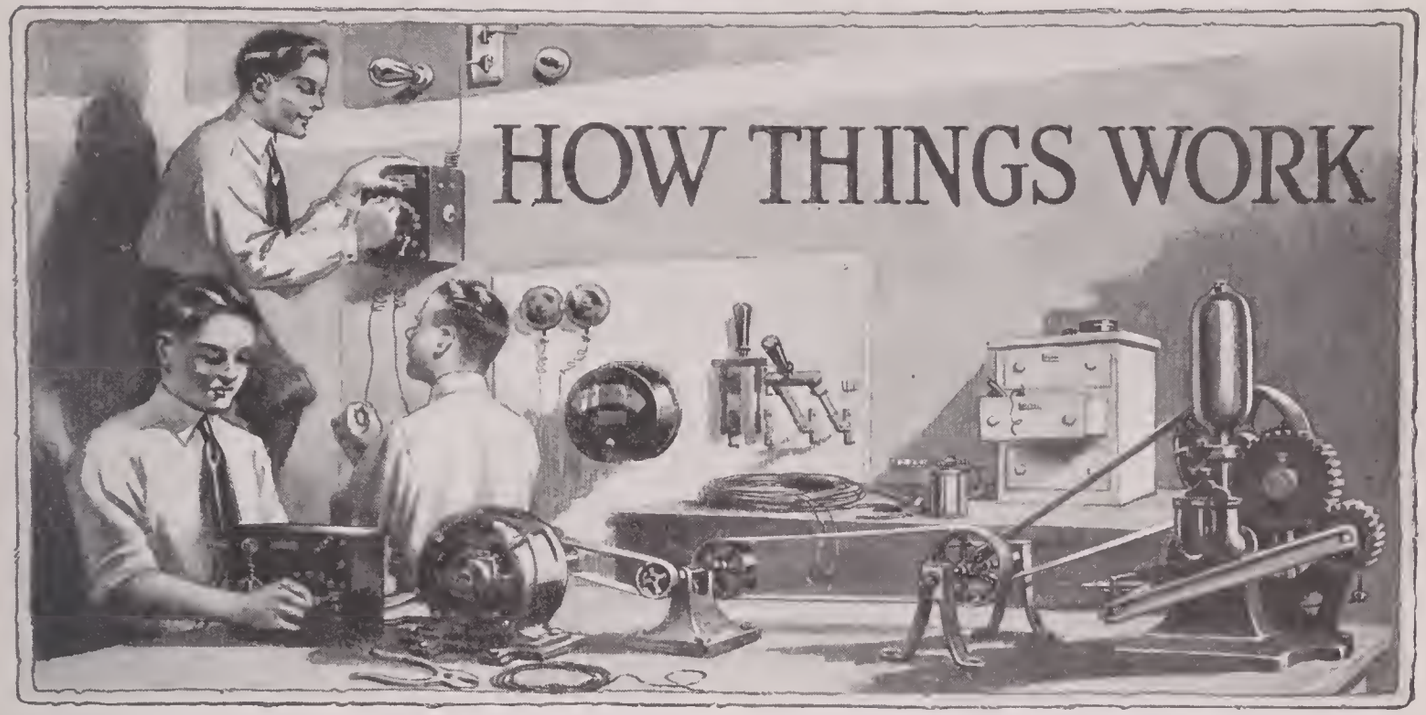
The valley of the Nile was the original home of flax and linen. Some of the chief centers of linen manufacture today are Belfast (Ireland), Dundee and Dunfermline (Scotland), Leeds (England), and certain towns in northern France, Belgium, and Germany.

Linné, Carl von (1707–1778). It was the great Swedish botanist Linné, generally known as Linnaeus, who first classified plants in a thoroughly systematic manner, and by bringing order from chaos did much to establish botany as a science. He also introduced double names, showing relationships, for the different species of plants. (*See* Botany.)

Linné was born at Rashult, in Sweden, in 1707. Almost as soon as he could talk the boy knew the names of the plants in his father's garden and in the neighborhood, so he was sent to the University of Upsala, where he showed great promise as a botanist. He made a 5,000-mile botanical survey of Lapland for the Upsala Academy of Sciences. His work was so successful that it aroused jealousies which forced him to quit his native land for Holland, where he studied medicine. His work attracted the attention of a Dutch banker, who made him director of his extensive gardens and greenhouses. It was during his stay in Holland that Linné gave the world his most important works, 'Systema Naturae', 'Fundamenta Botanica', and 'Genera Plantarum'.

After a visit to England, another stay in the Netherlands, and a visit to France, Linné returned to Sweden. He soon was given the chair of botany at Upsala, which he held the rest of his active life.

Linoleum and Oilcloth. Linoleum, which was introduced as a floor covering in England in 1860, is made by spreading in a uniform layer on burlap or coarse cloth a mixture of oxidized linseed oil and ground cork. Rosin and kauri gum are added to make the dried oil more elastic and rubber-like. Inlaid linoleums are produced by placing together in patterns mixtures colored with different pigments and then pressing with hot rollers. Oilcloth is made by coating coarse cloth with white lead mixed with pigments, and printing patterns on the surface.



The MARVELOUS LINOTYPE *and* WHAT IT DOES

WITH his invention of Printing, Gutenberg unlocked the Gates of Knowledge and put books, hitherto the costly possession of the few, into the hands of the many. The invention of the Linotype by Mergenthaler, 400 years later—one of the triumphs of modern invention which seems almost to think—helps to make possible the chief newspapers and magazines of today.

LINOTYPE. It was Johann Gutenberg, a German in the 15th century, who laid the foundations of modern printing by casting metal type; and it was Ottmar Mergenthaler, a naturalized American watchmaker of Gutenberg's race, who took another forward step near the close of the 19th century and gave mankind the linotype. We say he gave it to mankind, for surely this was a gift to all our race. When Gutenberg was a boy, artists drew their pictures by cutting them in wood, and the wood blocks were inked over and proofs were printed from them. Then whole pages of letters and words were cut in one piece of wood; but it was Gutenberg who first of all worked out a process for rapidly and cheaply casting in metal separate types of accurate dimensions.

Out of Gutenberg's invention grew all modern printing. But setting the type was all done by hand, and the books and newspapers our fathers read were all "set up" letter by letter. A man would stand at a "case" with thousands of letters in more than a hundred little boxes; and before a daily newspaper could be printed scores of men must stand at these boxes, picking up perhaps a million pieces of type or more, all so valuable that they must be carefully "distributed" again into their little boxes after they came off the press—a most tedious and expensive process.

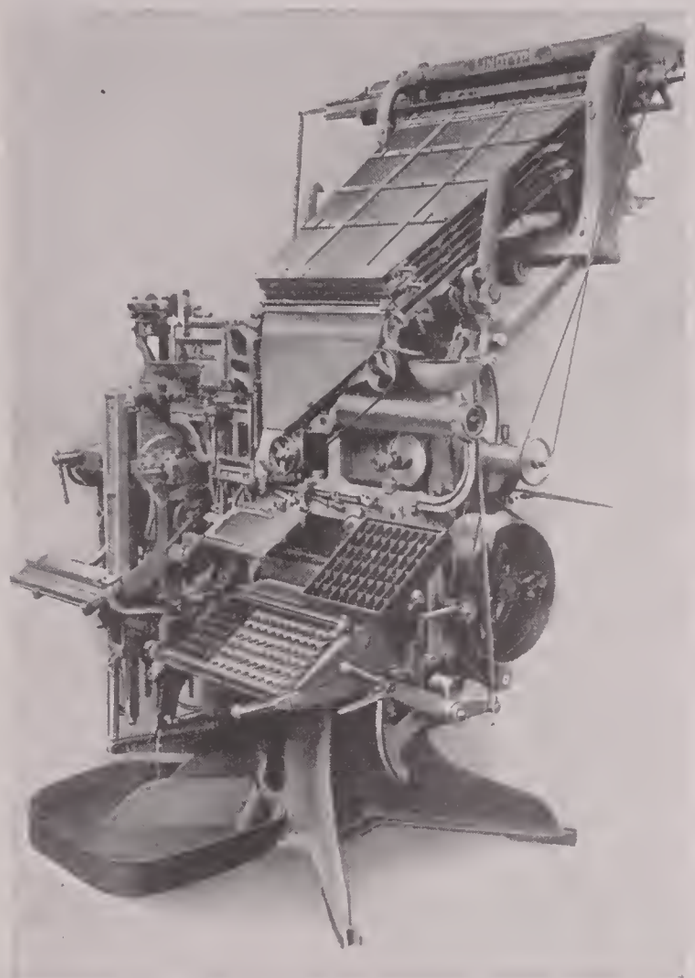
A skilled operator could set an average of 3,000 characters an hour—enough to make 60 lines, or just about a column, of the type used in this book. "Distributing" is done about twice as fast—that is, one man can distribute the type set by two.

For 400 years after Gutenberg this was done, and there was almost no other way of printing until about 50 years ago. Many men had worked on inventions for type-setting machines which would "compose" or bring together the type by touching a keyboard. Their inventions, although very ingenious, were usually costly and cumbersome, and required two or even three men to operate them, and the result was that they remained mere curiosities; one or two of the simpler devices may still be seen in operation in isolated places, but they are gradually being displaced by the linotype or monotype (*see* Monotype). Not the least of the advantages of the modern machines is that they do away entirely with the laborious and costly process of "distributing" the type (returning it to its "cases") after it is used; and instead, it is simply thrown into the melting pot to be cast again into new type combinations.

It was the clever brain of Mergenthaler that worked out the underlying idea of the linotype, the machine at which a man can sit and think, "What a beautiful thing a rose is!" and set up the words in a solid line of type even as he thinks them. It is a machine that almost thinks; is in itself one of the great mechanical wonders of the world, and with the power press has brought books within the reach of everyone.

See how it saves labor! A good linotype operator sets 10,000 characters an hour—as much as three hand compositors—and distribution is done away with. Without these savings in time and labor, the big modern newspaper would hardly be possible.

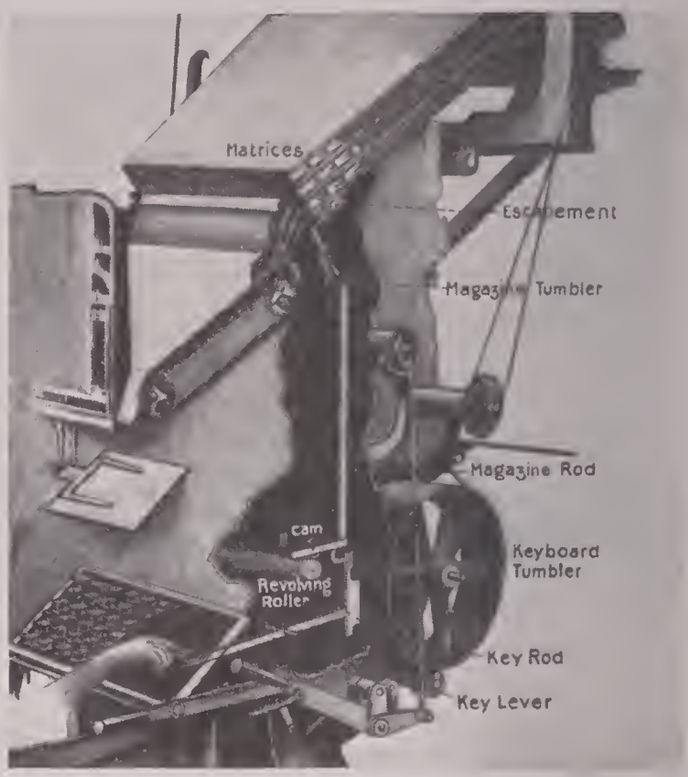
Here we see the linotype and the way it works; practically every newspaper and magazine you ever see is "set up" by linotypes. There are a number of different models of these wonderful machines, and some of them differ in details from the pictures here printed; but the principles in all are the same, whether used in the United States, Great Britain, Continental Europe, or far-off Australia and South Africa.



1. How the Letters of the Linotype Fall into Their Places

1. The linotype, so called because it sets up a "line of type," is shown complete in the picture above. In each of the cases or magazines at the top are about 1,500 brass matrices with the faces of nearly a hundred letters cut in them. By many wonderful processes a matrix is brought to the place where it is wanted, other letters fall by its side and close the face of an adjustable mold; and molten metal comes pouring up to them. Instantly the metal sets hard, and lo! we have a solid "slug" which bears our line of type.

Next (1a), we see the operator pressing down a letter on the keyboard. As the key goes down the other end of the key-lever comes up, raising the key-rod with it. The raising of the key-rod removes the support of the horizontal bar on which the cam rests, and the cam then falls upon the revolving roller. As the cam goes around, its uneven rise-and-fall action causes the magazine-rod to rise and fall also, and the result of this is that what is called the magazine-tumbler is made to rock. That is exactly what is wanted, for this tumbler, by working the escapement, controls the brass matrices with the letters cut in



1a. What Happens When the Operator Presses a Key

them, and one of these must run down to an opening in the front of the machine. The mechanism we have followed runs separately from every letter on the keyboard to a "channel" of letters in the magazine at the top, and the pressing down of the key, and all the movements that follow, are for the purpose of bringing one of these letters down.

2. Here we see the matrix itself, a curiously shaped little thing of brass, with teeth like a double set of steps, which serve a most important purpose. But most of all we must notice the letter cut in its side. In the matrix shown here there are two letter *o*'s, one in Roman type and the other in italic, so that either can be used by a clever movement on the part of the operator. Notice that the letters are like tiny hollow molds, instead of projections.



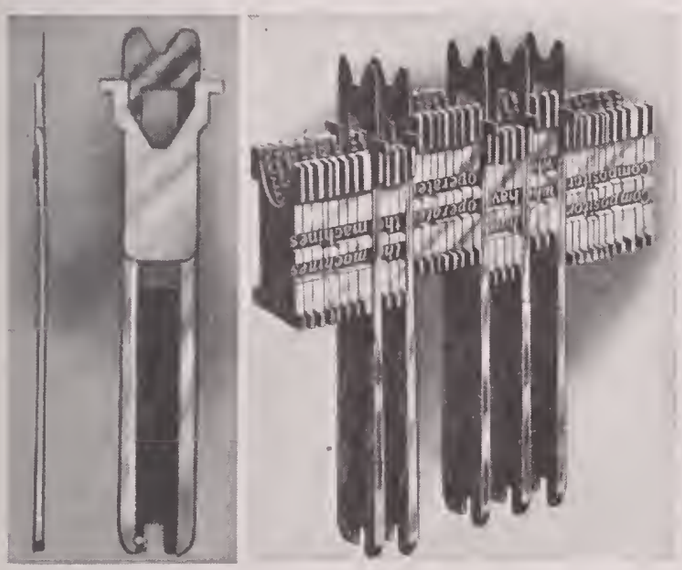
2. The Little Brass Matrix which Casts the Face of the Type

3. On being released the matrix drops down a groove in the front of the machine. The traveling belt seen in this picture (3), running down from right to left across the front of the machine, solves the problem of bringing the matrices together in their proper order, for it is so cleverly arranged that, although there are 90 different letters and figures, all coming from different places, every one of them takes exactly the same time on its journey. Each goes to



3. How the Little Brass Matrix Rides into the Middle of a Word

what is called the assembly-box at the end of the belt, the belt dropping it neatly at the end of the line. In this picture the assembly-box is shown about half full of letters.

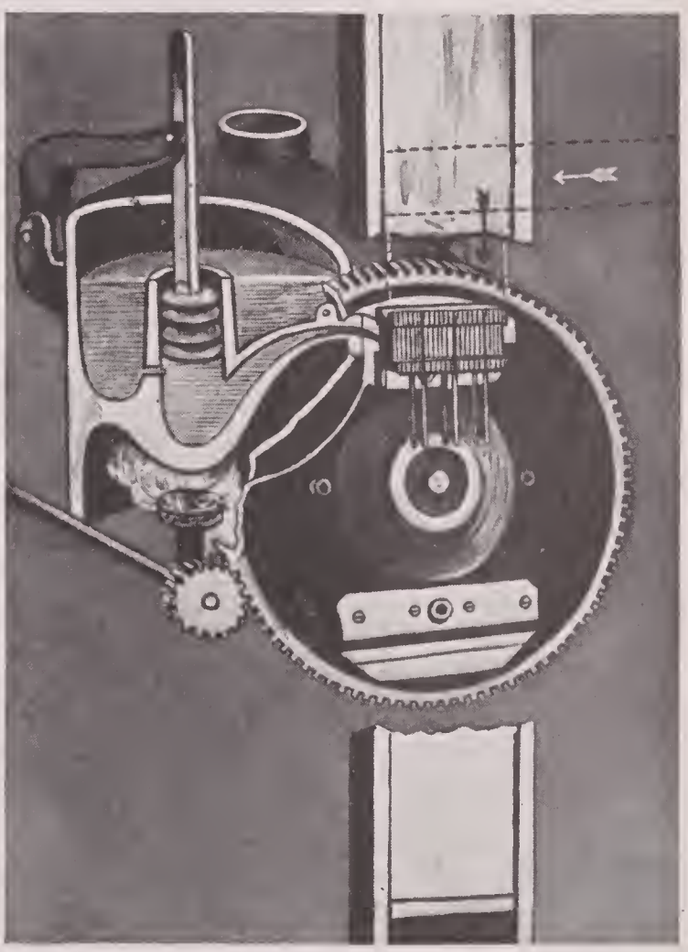


4. The Little Sliding Wedge that Spaces Out the Words

4. We shall see at once, the moment we think of it, that the spacing out of the words to make the lines of uniform length must have been a bothering thing to the inventor of the linotype. After one word the operator touches a special key for spaces, and down slips one of these curious steel wedges, made to slide up and down on the matrix-shaped piece to which it is fastened. Now come down more letters; and at the end of another word comes another wedge. At last the line will not take in another complete syllable, and yet it is still a little short. The operator then pulls a lever and a bar strikes the butt end of the wedges, expanding them so as to make the line the proper length by adjusting the spaces equally between each of the words.

You would have thought yourself a clever inventor if you had thought that out; and it is only one of a hundred clever things in the linotype. The inventor of this spacing device was a man named John R. Rogers, an American inventor who not only has to his credit more than 400 separate patents on type-setting machines, but also helped to make the Liberty motor and wireless telephone a success.

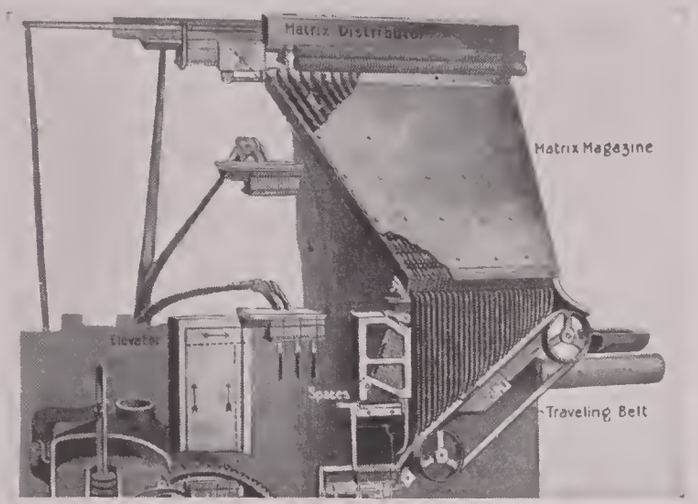
We see in this picture (4) a line of matrices spaced out, and if you turn this page upside down you will be able to read the words which they spell. The illustration also shows how the matrices are shifted whenever the operator wants to bring the italic letters into the line to be cast.



5. The Letters Arrive at the Casting Mold

5. At the back of this wonderful machine that we see, and in the very heart of it, are type-metal and fire. A gas jet beneath a pot is burning all the time, keeping the type-metal molten. In front of the metal pot is what is called the mold-wheel, and at the top of this wheel is a long thin slot. This is the mold in which the body of the line is cast. The line of letters

that we have seen fall into their places are raised by the movement of the lever so as to follow the direction of the arrows in this picture (5), until they rest in front of the slot in the wheel. The cut-out letters are facing the slot, pressed tight into it. Now you will guess what happens. Coming down into the pot is a plunger, and as the line of matrices rests against the slot the plunger descends and forces the molten metal into the mold and against the line of matrices. The end of all these operations has now been reached, for the solid piece of metal thus cast has upon its face in raised-up letters the words that are cut into the line of matrices.



6. How the Little Brass Matrices Go Home Again

6. Now the brass letters have done their work, and must go home, ready to be used again. Here we see them still in their place at the slot in the mold-wheel, and we see in this picture (6) a curious suggestion of what happens. Above the mold-wheel rises a strange mechanical arm, which pounces down, picks up the matrices, and takes them to the top of the machine. They rise first of all in the direction of the arrows until they reach the place where the elevator comes down to them. There is only one arm, of course, in the linotype; the extra arms are shown here to explain the movement.

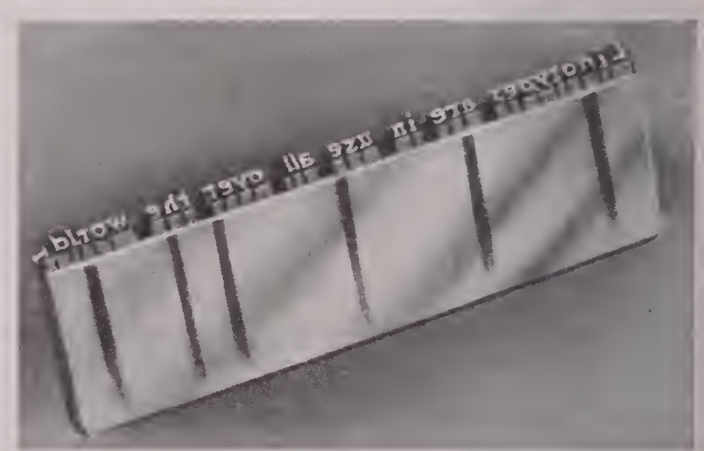
The complex mechanism of such a machine as the linotype can hardly be realized. Nothing is simple. It would seem simple enough, perhaps, to lift away this line of words now that it is done with, but what is to happen to the long wedges that make the spaces? They do not go the same way home as the matrices, and arrangements must now be made for two separate journeys. What happens is that the space-bands are not gripped by the elevator, which takes off only the matrices, and another complicated piece of mechanism, not shown in these pictures, takes away the space-bands and drops them in the space-box on the right. The matrices are carried by the elevator to the distributor bar, which runs along the top of the machine. It is now that we come to the part played by the teeth in the top of the small brass matrices. We shall see how they guide the matrices back home again, each to its proper berth.

7. The bottom of the distributor bar is cut into ribs, as shown here (7), and the ribs are of varying length and arranged in varying ways. We can easily



7. How the Matrices Find Their Way

understand what happens now, for the little matrices, hung on to the distributor bar by the elevator, are pushed along until the teeth fit exactly into the ribs and spaces of the bar. Then they fall, and when they fall they are home again, each in its proper channel in the magazine. The matrices are moved forward by the long revolving screws on each side of the bar, as shown in the last picture (6).



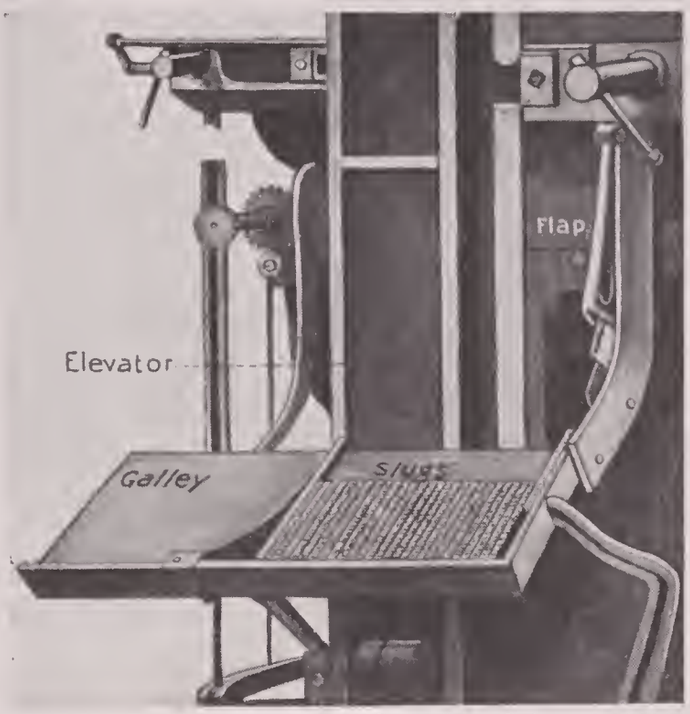
8. The Line of Type

8. This is the line of solid type or "slug" as it leaves the mold-wheel. The letters on the matrices are cut *into* the metal, and read "like print." On the type slug, however, the letters are *raised* and read *backward*, in order to make them come right when printed. Perhaps if you will hold this picture before a mirror you can read what the types on this slug say.

9. We have seen the line of type as it is made, but we have missed the knives which cut it and trim it clean as it is carried from the mold. Passing between

two parallel knives, it is shaved to the exact length, width, and height required. It is then lifted mechanically to a position from which it slides into its place next to the line which was cast before it. We see the new line slipping into place in picture 9, and so the lines—or "slugs," as the operators call them—come into the galley-box arranged in column form, whence they are carried to the galley-press, on which they are proofed for correcting before they are made into pages.

We have now, in not many minutes, tried to understand the marvelous machine which Mergenthaler and a number of other clever men spent years in inventing; but we should have to live with the linotype, or sit at it day by day, as the men do who set up our newspapers, if we would understand it all. One such machine can easily do the work of five or six hand printers. Even in this mechanical wonder there is no finality, but the wonder grows and grows; and now we have linotypes with *four* magazines of letters at the top instead of only one, and with two complete alphabets in each magazine, so that a single machine may carry eight alphabetical sets in different sorts of type, with a total of 720 separate characters all worked from one keyboard.



9. The Lines of Type Grow into Columns

By the use of different "fonts" of matrices and different sized mold-slots, slugs may be cast from 5 point to 36 point (½ inch) in letter height and up to 5 inches (in exceptional machines 6 inches) in length. But the principle of all this wonderful machine is still the old one discovered by Gutenberg—the casting of metal characters by means of matrices which close the opening of a type mold.

"A drop of ink makes millions think," said Lord Byron; and this machine that makes the type for miles of paper and rivers of ink makes us think too. It is as good as a steel brain.

A NEWSPAPER "BATTERY" OF LINOTYPES



This photograph taken in the plant of the *Chicago Tribune* shows how important a part these machines play in the life of a newspaper. These are less than half of the linotype machines used in the daily publication of the paper. With their aid, the printers can not only set an amazing variety of type, but by dividing up the labor on a "big story" can rush it into print almost as fast as it can be written on a typewriter. The machines are numbered, as you see, and the work is distributed among them in "takes," which are gathered together when they have been set in type, and placed in their proper sequence in the pages.

contained in the Easy Reference Fact-Index at the end of this work

KING LION

The Monarch of the Cat Family



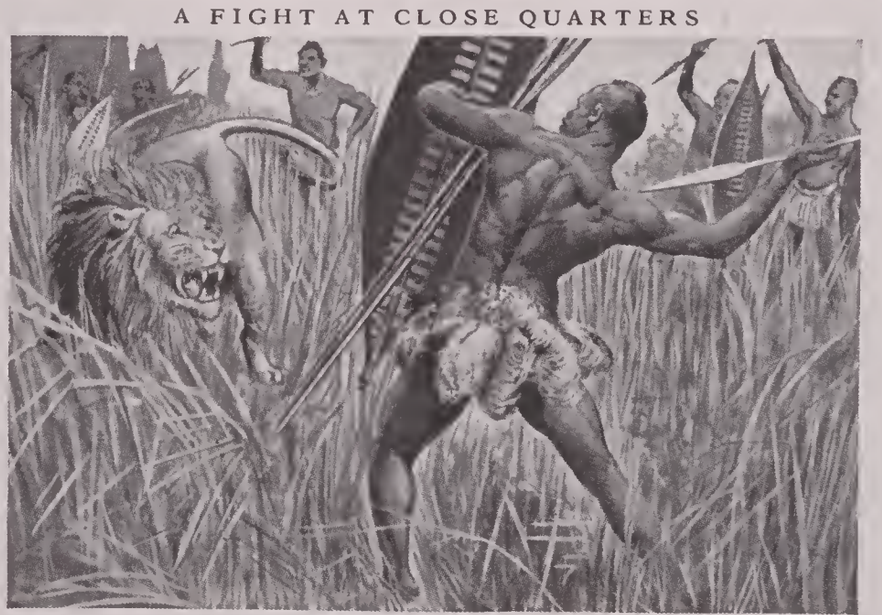
LION. Can you imagine that your cat—that soft, gentle, playful, purring pet—belongs to the same family of animals as the majestic lion which many centuries ago was given the title "the king of beasts"? "That cannot be true!" you exclaim at first thought. "A cat and a lion are not at all alike."

But you are mistaken. They are very much alike indeed, except in size and perhaps in color. Of course there are other differences of minor importance. Thus the pupil of the cat's eye is elliptical, that of the lion is round. The cat is a good tree-climber, while the lion does not climb trees. The cat's fur is of nearly an equal length all over its body, while the male lion possesses a mane which, when at its best, covers the fore part of its body including the head and gives the creature a truly royal appearance.

In ancient times the lion inhabited the whole of Africa, all the southern part of Asia, and a large part of southeastern Europe. It is still found in many parts of Africa and Asia though in greatly reduced numbers. A large lion measures from nine to ten feet in length, including the tail, and is four feet high. It is not as large as the largest tigers, some of which attain 11 feet in length and weigh from 450 to 500 pounds. But the strength of the lion is prodigious. With a single blow of its massive forepaw it can crush the skull of an ox or break the back of a horse, and it is capable of carrying off a bullock in its jaws. It can cover 30 feet at a single bound, and few animals except the antelopes can outrun it. Its tawny color blends readily with its natural surroundings and renders the lion almost invisible in its native haunts.

Authorities disagree in regard to the hunting habits of lions. It seems probable that as a rule they live and hunt singly, except during the mating season and while the young are half grown, when the whole family unites in the chase. Travelers in South Africa report that lions are sometimes seen hunting in droves of from six to ten. These droves may be composed of two or more female lions and their cubs.

A FIGHT AT CLOSE QUARTERS



The natives of the African interior frequently hunt lions on foot, armed with no better weapons than spears. Here we see a party of Kaffir warriors who have a lion at bay. Surrounded by the shouting and singing throng, the lion is confused and hesitates. Then a great black spearman leaps forward; the lion rushes at him, only to be met by a well-directed spear. Soon twenty spears put an end to the battle. The hunters, however, are often wounded and killed in these encounters before the lion is dispatched.

In common with most members of the cat family, the lion prefers to hunt at night, setting forth at sunset and lying in wait for its prey at a watering place, or beating the range stealthily, in true catlike fashion, keeping to the leeward of the breeze, and cleverly taking advantage of every bit of cover until it is within striking distance. Then

it utters its terrifying roar and leaps upon its victim, which it dispatches by biting in the neck. The lion rarely attacks an elephant, but deer, antelopes, zebras, wild asses, and buffaloes, as well as domestic animals, including camels, are on its regular bill of fare. A full grown buffalo bull with its long sharp horns is the only one that is capable of successfully defending itself.

Man-eating lions are not common. It is said that usually they are very old lions, and that, like the tiger, when once they taste human blood they persist in the habit as long as they live. Man-eating lions have been known to enter the native villages and carry off a man or a woman in their jaws, in spite of fires and shouts and beating drums. The story is well known of the two lions which killed so many native workmen that for weeks they halted the building of the Uganda railway.

The young of the lion, generally only two in a litter, are born in a den in some secluded spot selected by the mother lion, who guards them jealously and does not permit even the male lion to approach. Like the tom-cat, the lion is inclined to make a meal of his offspring. The mane begins to grow on the young male during its third year, but it does not attain its full growth until the seventh or eighth year. Lions live from 40 to 50 years. They are easily kept in captivity. Scientific name, *Felis leo.*

The Story of Androcles and the Lion

EARLY one morning, in the First century A.D., a weary man came to a cave in an African desert, and flinging himself on the ground, fell into a sound sleep. This poor man was a Roman slave named Androcles, who had been carried from Rome to northern Africa. His master was very cruel and he had watched his chance to make his escape through the darkness.

Suddenly he was awakened by a terrible roar, and starting up, he beheld a huge lion standing at the entrance to the cave. He had been sleeping in the lion's den. There was no way of escape; the beast barred the way. Terror-stricken, he waited for it to spring upon him and tear him to pieces. But the lion did not move. It stood there moaning and licking one of its paws. Then Androcles noticed that the paw was pierced by a great thorn and that blood was flowing from the wound. Seeing the poor animal in pain, he forgot his fear, and taking the paw in his hand, drew out the thorn and stopped the blood.

For three years Androcles and the grateful lion lived together in the cave. They hunted together, ate together, and slept together.

But Androcles longed to be once more among his fellow-men, and he left the lion's cave. Very soon he was caught by some soldiers and sent to Rome. In those days the Romans were very cruel to runaway slaves; they ordered them to be thrown into the arena to fight wild beasts for the public amusement.

Androcles was pushed into the arena, which was surrounded by crowds of people. A lance was thrust into his hand and he was told to defend himself against a powerful lion, which had been kept without food for several days in order to make it more ferocious.

Androcles shook with fear as the cage was opened and the lion sprang out with a terrible roar. But instead of rushing upon him, it showed itself friendly and began to lick his hands. Then he saw it was the very lion that had been his companion in the cave. Androcles leaned against the lion's mane and wept.

All the people marveled at this strange sight. The emperor sent for Androcles and when he heard his story he set him free and presented him with a large sum of money. After that, whenever Androcles walked through the streets of Rome, the faithful lion followed him about like a dog.

LIQUID AIR. If you had some liquid air in a container it would look much like water, only it would not be so clear. But it would act very differently from water. If you poured it on a block of ice it would boil vigorously, sending off clouds of vapor. A steel watchspring dropped into it and touched with a lighted match would burn beautifully, with a dazzling shower of sparks. A piece of rubber dipped into it becomes as brittle as glass, and an egg appears as a shining blue ball.

Just as water passes into steam at its boiling point 212° F., and becomes solid ice when the thermometer falls below 32° F., so all other matter changes by the addition or subtraction of heat. Even iron becomes liquid and then passes into heavy vapor fumes when the temperature reaches a certain high point. Air is made liquid by lowering its temperature under pressure to 312° below zero (Fahrenheit), a cold so intense that we could not survive an instant in it. Although it is then a liquid it is not wet, any more than molten iron is wet. At a lower temperature still, liquid air changes to a solid.

It was discovered in 1894 that when air becomes liquid it resolves itself into the elements that compose it, oxygen and nitrogen. The carbon dioxide present early crystallizes as a solid, giving the liquid its cloudy appearance, and it can easily be filtered out. Liquid nitrogen evaporates more readily than liquid oxygen, and so it comes off first. Thus as the liquid air evaporates it becomes richer and richer in oxygen.

Practical use is made of liquid air to manufacture oxygen from the atmosphere, to obtain nitrogen for fertilizing purposes, and as a refrigerating agent. It can also be used as an explosive, as it exerts a pressure during evaporation of something like 10,000 pounds to the square inch; but it is hard to control.

LISBON, PORTUGAL. Seven miles from the Atlantic, up the wide swift channel of the Tagus River, lies Lisbon, the capital of Portugal, and the westernmost seaport of continental Europe. The approach from the sea is like a trip up the neck of a great bottle, for immediately above the city the river broadens out into a tidal lake, 4 to 8 miles wide and 11 miles long, forming one of the best harbors in the world. Here great steamers from South America and from Portugal's distant colonies in Africa or the East Indies lie at anchor alongside British or United States merchantmen, while native fishing boats with bright-painted hulls and three-cornered sails bring in their catch, with songs and shouts from the half-naked dark-skinned crews. The wharves and quays stretch along the northern banks of the river and lake for five miles. Beyond them the city itself rises in terrace upon terrace of white houses and green parks, backed by the granite mountains of Cintra.

Lisbon is almost entirely a modern city, for the earthquake of 1755, which killed more than 30,000 of its inhabitants, left only a small section of the town standing. This section contains, however, many interesting relics of ancient days. Here in the cathedral, first built in 1150, is the tomb of St. Vincent, patron saint of Lisbon, and in the cathedral grounds near by are kept a pair of ravens, popularly believed to be descendants of the birds which, according to legend, guided the saint's vessel to the city in the 3d century.

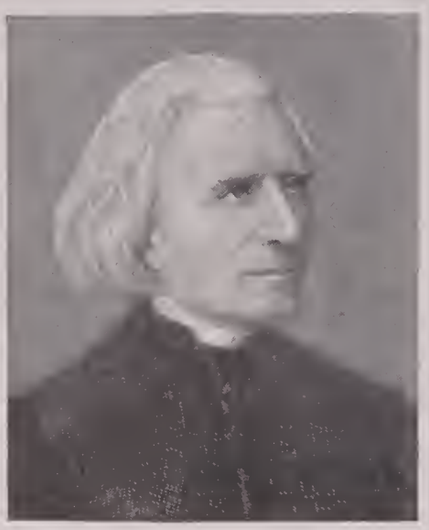
The modern part of Lisbon is not surpassed in beauty by any European capital. The streets are straight and broad, the finest of all being the Avenue of Liberty, a mile long and 300 feet wide, with a double row of shade trees down the middle; its name commemorates the freeing of Portugal from Spain in 1640. Between the terraced levels of the city elevators carry people up and down. Lisbon also boasts one of the finest botanical gardens in Europe.

Lisbon crowds are always picturesque. Barefooted fish-wives, with gaudy shawls, balancing trays of fish on their heads, and farmers with sombreros and brilliant sashes, mingle with the fashionable crowds in good-natured fellowship. The milkman drives his cows through the city morning and evening and milks them at your door. Ox-carts with pyramids of cabbages, turnips, and tomatoes rumble along, and strange cries announce the wares of the fruit vendors —strawberries, melons, oranges, and pineapples.

The industries of Lisbon include distilling, dyeing, the manufacture of silk, linen, wool, and cotton cloths, pottery, soap, paper, chemicals, cement, cork, and canned foods. It is a busy railway center, and its fisheries are among the most profitable in Europe. Population, about 440,000.

Lisbon was probably founded by the Phoenicians, for it was a flourishing town before the Romans occupied it. It was held by the Moors from 711 to 1147. Vasco da Gama set sail from Lisbon for his voyage around Africa in 1497, and it was from here that the Spanish Armada started on its ill-fated voyage in 1588, while the city was in the hands of Spain. Lisbon was the chief scene of the Revolution of 1910, when the crews of revolting warships shelled the palace, and King Manuel was driven pell-mell from Portugal and the republic established.

LISZT, FRANZ (1811–1886). The flickering lights of a gipsy campfire fall with softening glow over the gaudy garments and dark passionate faces of a group of singers gathered about it. Slightly apart in the shadow sits a pale dreamy-faced stranger listening. The fire burns low and the song with its mournful lament, its glad mad gaiety and plaintive wistfulness, dies away; but still the stranger sits, transfixed and silent in the darkness.



FRANZ LISZT

It was the great musician, Franz Liszt; and that night by the gipsy campfire there were born in his soul the strains that later were to leap forth at the touch of his fingers upon the piano keys in the witchery of his 'Hungarian Rhapsodies'.

This "Hungarian wonder child," as Liszt was called, began his public career at the age of nine. His father, an accomplished musician, taught him the theory of music and to play the piano. But the strange rhythms, and weird sweet melodies of his compositions he owed to the wandering gipsy bands of his childhood home in western Hungary.

As a little boy Liszt showed such musical genius that Hungarian noblemen furnished the money for his parents to take him to Vienna and give him the best musical instruction. At the age of 12 his playing so moved the great Beethoven that, lifted from his customary reserve, he took the child in his arms and kissed him. At 14 years of age Liszt composed a successful operetta, and from this time on his compositions were eagerly received.

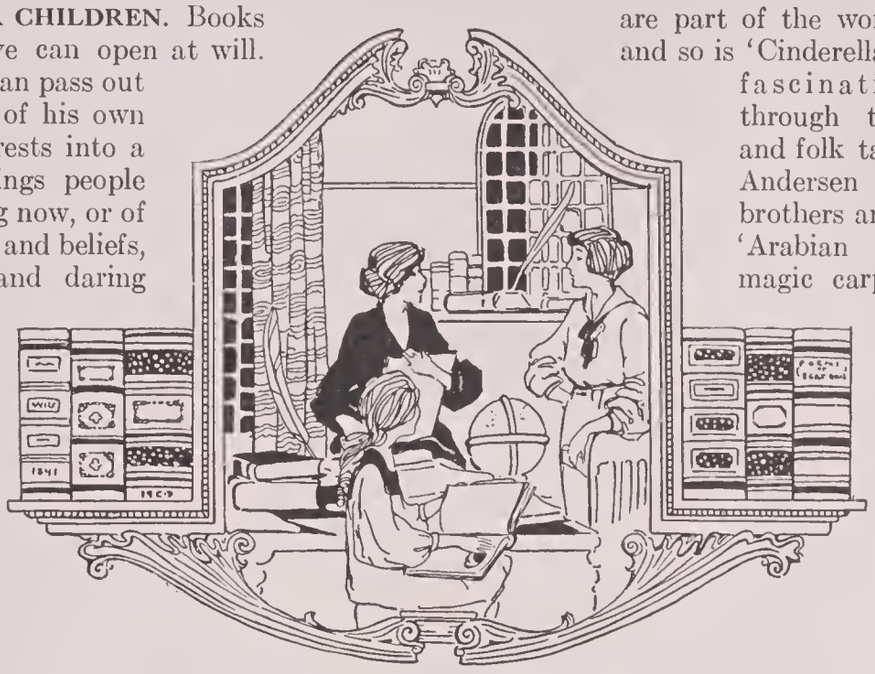
Liszt's life was a long series of artistic triumphs. As a concert pianist he has perhaps never been excelled. It is said that he showed the world how to perform feats in piano playing which before his time had been considered impossible. His compositions include works for the piano, organ, orchestra, and voice. He became a great teacher, counting among his pupils many of the greatest musicians of the 19th century. He became director of music to the Grand Duke at Weimar (Germany) and was decorated by every court of Europe.

The kindness and generosity of Liszt have become proverbial, as has also his appreciation for struggling young artists. Among many whom he befriended were Chopin, Berlioz, Schumann, and Wagner. The latter declared Liszt was the "one who first gave me faith in my work." Along with a warm heart and

nobility of character went all the eccentricities and vagaries of a temperamental genius. At the age of 50, withdrawing from the gay and brilliant circle in which he had moved, he received minor "orders" in the Roman Catholic church and was afterwards known as Abbé. He died in 1886 at Bayreuth, Bavaria, where, as was his custom each summer, he was superintending the production of Wagner's operas.

The SHINING DOORS *to* WONDERLAND

LITERATURE FOR CHILDREN. Books are like doors we can open at will. Through them one can pass out of the little house of his own knowledge and interests into a bigger world of things people are thinking or doing now, or of beautiful imaginings and beliefs, and brave deeds and daring adventures of olden times. One book may open the way to a fairy garden, another may lead to the crusade of Richard the Lion-Hearted.



In school your reading is all mapped out for you; but in pleasure reading you may go your own way, picking out what you like best from the vast array of world literature.

It is well to have pride in choosing our books, just as we have in choosing our friends. We do not like to think of ourselves as always associating with persons ignorant and coarse, and careless in speech and manners. Still less do we desire friendship with the really bad. Constantly reading silly or poorly written books, or books that make evil things seem right, will have precisely the same effect on one's character and manners as being always with the wrong sort of people. Choosing the best books will lead us into the society of the world's greatest minds, and make us capable of enjoying that society.

Children, Don't Be Afraid of "Great" Books

It is not at all necessary to be afraid of the books called great. Much of the best of literature is most interesting to the younger folk. Some of the famous classics are old tales grandmothers used to tell boys and girls long ago—rhymes to tickle their ears, like Mother Goose; pleasant poems and songs; fables about animals; tales of the elves and goblins thought to inhabit wood and mountain; stories of the gods of earth and sky that ancient peoples believed in. Other books contain songs and tales that traveling musicians and story-tellers told about brave heroes. Some very famous books, like 'Robinson Crusoe' and 'Gulliver's Travels', were not written for children at all, yet children have claimed them for their own.

Whatever one's taste, there are good books to satisfy it. 'I Saw a Ship A-Sailing' and 'My Shadow' are part of the world's good literature, and so is 'Cinderella'. One of the most fascinating book-paths is through the land of fairy and folk tale. Hans Christian Andersen and the Grimm brothers are guides thither, and 'Arabian Nights' is itself a magic carpet to transport the reader to the mystic Orient.

Another beautiful region into which some of the greatest books lead is that of mythology. These tales carry one to Mount Olympus in ancient Greece, where dwelt Zeus, king of the gods, and Apollo, god of light and music, and Aphrodite, goddess of love and beauty. Others take one to the northland, where, in the flickering of northern lights, and the thunder-sounds of storm, the old Norsemen saw the Valkyrie riding, and heard the hammer of the god Thor, the thunderer.

Every land has had its early heroes, and great poems and story cycles have grown up about them. At first a boy or girl cannot easily read the whole long poems, even in translation, but most of them have been put into a form more easily understood. The travels of Odysseus, the wise hero of the Greeks, the wanderings of Aeneas, the deeds of Beowulf, the prowess of Roland or of King Arthur—these are a few of the hero-tales.

Hero Stories of the Bible

Great heroes appear in the Bible stories, also. It is not necessary to read the Bible through to learn about them. Read the story parts. It is good sometimes to forget one has learned all about those stories in Sunday school, and to sit down and read about them as one would any other book. Such tales have been rewritten for children; but it is far better to read them in the language of the Bible itself.

There are plenty of good stories, too, about boys and girls of our own sort, living in times like our own —such books as Louisa Alcott's, or 'Tom Brown's School Days', 'Hans Brinker', 'The Story of a Bad Boy', or 'Tom Sawyer'. Our own time is producing numerous books about boys and girls of today—books good and books bad.

contained in the Easy Reference Fact-Index at the end of this work

The field of the novel and short story is one that widens as the reader grows older, and exploring it brings both fun and profit. Many entertaining novels and stories have a valuable background of history. Facts closely packed in school histories sometimes seem dry; but when we supplement them with stories like 'Kenilworth' or 'The Pathfinder' or 'The Last Days of Pompeii' they have new meaning.

One of the most interesting things in the world is the life story of some great man or woman. Everyone likes a story with a hero who accomplishes something in the face of odds, and every great person is such a hero. Whether it be Napoleon or Joan of Arc, Florence Nightingale or Robert Louis Stevenson, the biography is inspiring. Reading of the deeds of such people, and of their human side—letters they wrote to their friends, things they said and did in private life—actually seems to admit the reader to intimate friendship with the great. The reason a humble person called Boswell became famous is that he wrote a long book that brings us very close to a great man—his 'Life of Dr. Samuel Johnson'.



Most boys and girls love poetry for its rhythm and beautiful words when their mothers recite children's verses to them. Yet certain older ones think they do not care for poetry. Even these, however, will find plenty of action and story interest in 'The Lady of the Lake', 'How They Brought the Good News from Ghent to Aix', 'The Ancient Mariner', or some of the old ballads. And besides action they will find rhythm and beauty and fitness of language that will open up a whole new world of seeing and feeling, a world the person who "doesn't care for poetry" shuts himself out of. Nature poems like Shelley's 'Cloud' or Wordsworth's 'My Heart Leaps Up' make us see nature with new eyes.

And then the plays—Shakespeare, of course. After reading Lamb's 'Tales', one is ready for the plays themselves, and the finest of reading they are, with their vivid action and wonderful pictures of nature.

These are only a few of the paths into which books and reading can lead us, if we are curious about new and wonderful things and willing to be led.

In choosing the right books, it helps, of course, to seek advice from some older person who knows. But we can judge for ourselves in many cases whether a book is good or not. One test is, Does it really interest us? A stupid book, or a goody-goody one, or a flat and silly one, cannot really please. Boys and girls want real thought and knowledge, brightness, action, and intelligence. But sometimes books that we know perfectly well are bad hold our interest. It is easy to give way to the worse side of our natures in reading, as in action. Yet, after all, it is not much of a hardship to give up the wrong sort of book, for one may be fairly sure of finding for every one of the fascinating bad books a good one equally interesting.

Some of the books one finds on library shelves, and maybe receives for Christmas, are easy to read and appear to have nothing wrong about them, and they perhaps fool the inexperienced reader into thinking them good. Among these are certain ones of the many scout and campfire and boarding school series or cheap historical tales with inaccurate backgrounds. They have some story interest, but they harm one by keeping him in the inferior company of an author who neither writes very well nor cares about being accurate. The way to distinguish such books is to get acquainted first with those that have been proved good; then one has a standard to judge by when reading newly published books.

In our pleasure reading we naturally think of what pleases us rather than of the good it is likely to do us. But it is interesting, after all, to see the effect reading the best books has had, not only on great writers but on men of action, like Franklin and Lincoln. We know the sure, direct, right thinking of Lincoln, and his power of clear, simple, beautiful speech. The ability to make his Gettysburg address came partly through his early reading of a few great books—his

Bible and Shakespeare. The best and greatest helped make him to be great. The best is none too good for any boy and girl.

Of course everyone who cares to read wishes to feel that sometime he can understand the best and greatest in literature. To do that, we begin by reading the easier good books such as children can enjoy, and through these travel on and on, until at last we—like the poet Keats when he looked into Chapman's translation of Homer—make discoveries undreamed of:

> Then felt I like some watcher of the skies
> When a new planet swims into his ken;
> Or like stout Cortez when with eagle eyes
> He stared at the Pacific,—and all his men
> Looked at each other with a wild surmise—
> Silent, upon a peak in Darien.

The day will come when the best and noblest of Milton, Shakespeare, Dante, Homer, and all the great writers of all time will be ours for the reading.

To help in making a happy choice, you will find here a list of 100 books proved by time to be good and not too difficult. So short a list can by no means include all the best books; many equally good ones are omitted. It is impossible, too, to include the many excellent and useful books not called "literature"—science and history books, handcraft books, and the like, which are valuable for their facts rather than for the manner of their writing. But the list is good to start with, and each interesting book can serve as a guide to others of related interests. Boys and girls who cannot easily reach a large library will find that if they write to the children's librarian in the nearest large city, they can get good advice on reading.

A book that will help older boys and girls in choosing their books is John Macy's 'Child Guide to Reading'. Frances Jenkins Olcott's 'The Children's Reading' and W. T. Field's 'Fingerposts to Children's Reading' are written for parents and teachers, but contain lists anyone can use. (*See also* American Literature; English Literature; Novel; Poetry.) The literature of other countries—not specifically for children—is discussed in this work under such entries as French Language and Literature; German Language and Literature; Spanish Language and Literature.

A List of a Hundred Good Books

Simple Stories for Very Little Children

'Mother Goose' (any good illustrated edition).
'Vieilles Chansons' (Old French Songs and Rounds). L. M Boutet de Monvel. (Can be obtained with both French and English text and has beautiful pictures.)
'A, Apple Pie'. Kate Greenaway.
'Tale of Peter Rabbit'. Beatrix Potter.
'Fables'. Aesop.
'Fairy and Household Tales'. Jacob and Wilhelm Grimm.

For Children who are Older and Love Fairy and Wonder Tales, and Stories of Animals and the Big Outdoors

'Fairy Tales'. Hans Christian Andersen.
'English Fairy Tales'. Joseph Jacobs.
'Celtic Fairy Tales'. Joseph Jacobs.
'Japanese Fairy Tales'. Lafcadio Hearn and others.
'King of the Golden River'. John Ruskin.
'Water Babies'. Charles Kingsley.
'A Little Boy Lost'. W. H. Hudson.
'The Rose and the Ring'. W. M. Thackeray.
'Alice in Wonderland'. Lewis Carroll.
'Adventures of Pinocchio' (from the Italian). Collodi.
'Prince Prigio'. Andrew Lang.
'The Bluebird' (from the French). Maurice Maeterlinck.
'Arabian Nights' (a good selection is that by Andrew Lang).
'Nights with Uncle Remus'. Joel Chandler Harris.
'Old Indian Legends'. Zitkala-Sa.
'Hiawatha'. Henry W. Longfellow.
'Wonder Book' and 'Tanglewood Tales'. Nathaniel Hawthorne.
'Norse Stories Retold from the Eddas'. Hamilton W. Mabie.
'Sketch Book'. Washington Irving. (Read 'Rip van Winkle' and 'The Legend of Sleepy Hollow'.)
'Old-Fashioned Tales'. E. V. Lucas. (Contains the best from some old-fashioned writers for children.)
'Robinson Crusoe'. Daniel Defoe.
'Pilgrim's Progress'. John Bunyan.
'Gulliver's Travels'. Jonathan Swift.
'Swiss Family Robinson'. J. R. Wyss.
'Tales from the Travels of Baron Munchausen' (edited by E. E. Hale).
'Child's Garden of Verses'. Robert Louis Stevenson.
'Poems of Childhood'. Eugene Field.
'Songs of Innocence'. William Blake.
'Children's Treasury of English Song'. Palgrave. (A good collection of poems children like will be better than whole volumes by each author.)
'Jungle Book'. Rudyard Kipling.
'Biography of a Grizzly'. Ernest Thompson Seton.
'Black Beauty'. Anna Sewall.
'Rab and His Friends'. Dr. John Brown.
'Bimbi' (stories for children). Louise de la Ramée.
'The Story Book of Science'. Henri Fabre.
'Hans Brinker, or The Silver Skates'. Mary Mapes Dodge.
'Little Lord Fauntleroy'. Frances Hodgson Burnett.
'The Prince and the Pauper'. Mark Twain.
'Heidi'. Johanna Spyri.
Bible. The Bible for Young People (Century) contains story parts and other selections suitable for children. Read just like any other story.

For Still Older Children, who Desire Stories of Heroes and Great Men, Tales of Adventure, Romances, Historical and Otherwise, Good Love Stories, and Stirring and Beautiful Poems

'The Heroes: or Greek Fairy Tales for My Children'. Charles Kingsley.
'Age of Fable'. Thomas Bulfinch.
'Story of the Iliad'. Retold by Alfred J. Church. (Later read Bryant's poetic translation.)
'Odyssey'. G. H. Palmer's prose translation, or Bryant's verse translation.
'Aeneid for Boys and Girls'. A. J. Church.
'Lays of Ancient Rome'. Thomas Babington Macaulay.
'Lives'. Plutarch.
'Age of Chivalry'. Bulfinch.
'Legends of Charlemagne'. Bulfinch.
'Boys' King Arthur'. Sidney Lanier. (Malory's 'Morte d'Arthur' simplified.)
'Idylls of the King'. Alfred Tennyson.
'Merry Adventures of Robin Hood'. Howard Pyle.
'Boy's Percy'. Sidney Lanier. (Stirring old English ballads.)
'Marmion'. Scott.
'Don Quixote de la Mancha' (from the Spanish). Cervantes.
'Scottish Chiefs'. Jane Porter.
'The Talisman'. Walter Scott.
'Westward Ho!' Charles Kingsley.

contained in the Easy Reference Fact-Index at the end of this work

'Treasure Island'. Robert Louis Stevenson.
'Count of Monte Cristo'. Alexandre Dumas.
'Captains Courageous'. Rudyard Kipling.
'Quo Vadis'. Henryk Sienkiewicz.
'Ben Hur'. Lew Wallace.
'Last Days of Pompeii'. Bulwer-Lytton.
'Lorna Doone'. R. D. Blackmore.
'Silas Marner'. George Eliot.
'Christmas Stories'. Charles Dickens.
'David Copperfield'. Charles Dickens.
'Vicar of Wakefield'. Oliver Goldsmith.
'The Peasant and the Prince'. Harriet Martineau.
'The Last of the Mohicans'. James Fenimore Cooper.
'Pride and Prejudice'. Jane Austen.
'Little Women'. Louisa M. Alcott.
'Little Men'. Louisa M. Alcott.
'Undine'. Baron de la Motte Fouque.
'Evangeline'. Henry W. Longfellow.
'Snowbound'. John G. Whittier.
Poems. Edgar Allan Poe. ('The Raven', 'The Bells', 'Annabel Lee'.)
Tales. Edgar Allan Poe. ('The Fall of the House of Usher', 'The Gold Bug', 'The Pit and the Pendulum'.)
'The Man Without a Country'. Edward Everett Hale.
'Uncle Tom's Cabin'. Harriet Beecher Stowe.
'Tales from Shakespeare'. Charles and Mary Lamb.
Plays. Shakespeare. (Read first 'Midsummer Night's Dream', 'The Tempest', 'The Merchant of Venice', 'Julius Caesar', 'Coriolanus', 'Macbeth', 'As You Like It', 'The Taming of the Shrew'.)
'Tom Brown at Rugby'. Thomas Hughes.
'Tom Sawyer'. Mark Twain.
'Story of a Bad Boy'. T. B. Aldrich.
'Cuore' (from the Italian). Edmondo de Amicis.
'The Oregon Trail'. Francis Parkman.
'Two Years Before the Mast'. Richard Henry Dana.
'Life of Nelson'. Robert Southey.
'Life of Columbus'. Washington Irving.
'Making of an American'. Jacob Riis.
'Birds and Becs'. John Burroughs.
'Walden'. Henry David Thoreau.
Essays. Ralph Waldo Emerson. (Read the shorter ones on 'Character', 'Friendship', 'Culture', etc.)
'Sesame and Lilies'. John Ruskin.
'Golden Treasury by Palgrave', or 'The Oxford Book of English Verse' by Quiller-Couch.

LITHOGRAPHY. A method of printing from smooth stone slabs or zinc or aluminum plates lightly etched in relief. The process as invented by the German, Alois Senefelder, in 1796, is as follows: The design is drawn on the highly polished surface of a large, thick slab of close-texture stone, either in a greasy lithographic ink or by lithographic crayon. The stone is then lightly etched with a solution of acid and gum arabic, the purpose being to set the ink of the design and to render the blank parts of the stone more retentive of water. In printing the surface is wetted, but the water remains only upon the blank portions of the stone. When the printing rollers, carrying a special greasy lithographic ink, are run over the stone, the wetted portions repel the ink, which is taken only by the parts covered by the design. A sheet of damp paper is then pressed upon the slab in much the same manner as in ordinary printing. The difficulty of obtaining large size flawless slabs of the stone used (a variety of calcium carbonate of porous texture found only at Solenhofen, Bavaria), led to the use of zinc sheets, and later aluminum as substitutes. These sheets have an added merit over the heavy stones in that they can be shaped to a curved cylinder, producing more rapid printing. (*See* Engraving.)

LITHUANIA. Founded as part of the territories of the crusading Knights of the Teutonic Order, there was a time when Lithuania was the largest state in Europe; for at the beginning of the 15th century its boundaries extended from the Black Sea to the Baltic. But it was then united with Poland, and became a dependency of Russia through the colossal crime of Poland's partition (*see* Poland); and in the 19th century an imperial edict abolished the very name of Lithuania. Through all the vicissitudes of their history, however, the Lithuanians have kept their identity as a people, and now since the World War they have once more become a nation.

Lithuania was the largest and the most southern of Russia's three Baltic states, and like Latvia (Livonia) and Esthonia, it was and is chiefly an agricultural country. Forests and marshes cover much of the land, and less than half of it is fit for the plow. Rye, oats, barley, wheat, potatoes, and flax are the leading crops. Stock-raising, poultry farming—particularly the rearing of geese—and bee-keeping are important occupations. Grain, cattle, hams, poultry, eggs, butter, timber, flax, linseed, hides, and wool are exported. Memel on the Baltic Sea—taken from Germany by the Peace Conference in 1919—seems destined to be the port of Lithuania.

The Lithuanians are well-built, with fair hair, blue eyes, and delicate skin. They are simple, honest, and industrious in their habits, but their lot has for centuries been one of poverty and wretchedness. They still speak their ancient language, which resembles Sanskrit, and is probably the oldest in Europe of the Indo-European languages, the family to which our own language belongs. People and language alike are close kin to those of Latvia, where dwell the Letts. Besides the people of Lithuanian stock, there are many Russians, Jews, and Poles, as well as some Letts, Germans, and other peoples. The Lithuanians, who had striven for self-government since 1905, declared their independence of Russia in February 1918. Under the constitution of the new republic, equal rights are granted to all citizens, irrespective of sex, nationality, and religion. Large colonies of Lithuanian immigrants have been established in the United States. Lithuania claimed Vilna as its capital, but Poland disputed the claim, and the issue was left to a plebiscite. The total population of Lithuania under the peace treaties is about 2,500,000, and the area about 19,000 square miles.

LITMUS. When a chemist wishes to learn whether a solution is acid or alkaline, he tests it by putting into it a bit of paper containing the chameleon-like coloring

matter called litmus. *Blue* litmus paper is turned red by most acids; *red* litmus paper is turned blue by alkalies or bases. Litmus is manufactured chiefly in Holland from lichens. The lichens are ground to a pulp with water, and potassium carbonate and ammonia are added. The mass gradually assumes a blue color. Chalk or gypsum is added to render the mass thick enough to be formed into rectangular cakes, which is the form in which litmus is marketed.

LIVER. In all animals that have a backbone, as well as in some that do not, there is a large gland called the liver, which serves as one of the digestive organs. The liver in man is situated in the abdominal cavity, on the right side slightly above and behind the stomach. It is the largest gland organ of the body, weighing from three to four pounds and measuring about six or seven inches from front to back, and about twelve inches from right to left.

The liver has four main functions: (1) It produces bile, which aids in the digestion and absorption of fats, and is the vehicle that carries some waste material from the body. (2) Glycogen (or animal starch) is formed from the sugar in the blood and stored away in the liver cells, to be given out again as sugar when it is needed. (3) The liver, during the digestive process, forms *urea*, one of the wastes of the human body, which must be thrown off (*see* Kidneys). (4) The liver also has an important duty in preparing fats for oxidation in the body.

Blood flows into the liver from two main sources. The small hepatic artery brings blood directly from the heart to feed the liver itself; the large portal vein brings all the venous blood from the stomach and intestines to the liver before it goes back to the heart. The liver makes important changes in this blood before it passes on to the general circulation.

Just below the liver is a small pear-shaped sac, known as the gall-bladder. This is used as a storeroom for the bile. The common bile duct conducts bile to the intestine just beyond the stomach.

LIVERPOOL, ENGLAND. If you sail from the harbor of New York, lined with its beetling skyscrapers and lighted by the towering Statue of Liberty, you may not be impressed at first sight by the seven-mile stretch of gray granite-walled docks as your vessel steams up the Mersey River to the long, low, broad stage—Prince's Landing—at Liverpool. But look well at it, for it is a marvel of engineering.

In one dock and another vessels are unloading wheat and oats from Australia, cotton from Brazil, grapes and wine from Spain, rice from Calcutta, india-rubber from the Amazon, and cottonseed meal from Texas (the American trade is naturally important owing to Liverpool's situation). Fleets of the largest passenger ships afloat drive hither and yon from Liverpool to all the great ports of the world, and the fortress-like warehouses at the end of the docks house goods from the ends of the earth.

In contrast with New York, which has a fine natural harbor developed piecemeal in the wake of traffic needs, Liverpool has a poor natural harbor which, by centralized control and carefully planned effort, has been developed into the second seaport of the British Empire and the leading port of Great Britain for export trade. Its facilities are systematically kept several years in advance of the demands of commerce, so that it is always ready to handle increased buisness.

WHERE LIVERPOOL'S FORTUNE LIES



The wealth of this great seaport rests upon the tremendous commerce which passes over its docks, up and down the Mersey River to and from the far quarters of the world. Here we see a part of the long stretch of water front, with a liner about to set sail.

The Mersey estuary, on which Liverpool is built, suffers from shifting sand-bars across the channel, and from a tide with a vertical rise and fall of 30 feet. To remove the sand the Liverpool Port Authority keeps a powerful fleet of dredges constantly at work maintaining a 30-foot low-water channel. The advantages of a tideless harbor have been practically secured by a wonderful system of "wet docks," operated like the locks on a canal. When a ship enters one of these basins, a water-gate closes behind it and remains closed, holding the water at a constant level, until the ship is ready to sail. The 65 docks together have a water area of 450 acres and quayage 27 miles in extent. One single dock, which can receive four ships at once, cost $16,000,000.

The system of warehouses is equally extensive. The tobacco warehouse at Stanley Dock, with its 13 stories and 36 acres of floor space, is said to be the largest in the world. At Herculaneum Dock a petroleum reservoir of 60,000 gallons' capacity has been hewn out of the solid rock.

The great floating landing stage is really a half-mile raft supported on floating pontoons. Officially, the northern half is devoted to ocean and coast steamers, while the southern part is for ferry traffic; but its 80-foot width permits it to be used as a street, a promenade, and a pleasure park. The whole system of docks, quays, and warehouses is public property, under the control of the Mersey Dock and Harbor Board, briefly known as the Liverpool Port Authority.

Liverpool lies wholly on the west side of the Mersey, but the Port Authority also controls the docks on the east or Birkenhead side, which do a large cattle import and coal export trade. All these vast and costly improvements have been made by the Port Authority without aid from the city or from Parliament. In fact, the show building of the city, St. George's Hall, was built for the local music festivals and assize courts out of a surplus from the income of a few early docks.

Liverpool has many manufactures, but it does not owe its importance to them. Its fortune has always lain on the water, even in the ancient days when a safe beaching ground for fishing boats, out of the swift currents of the Mersey, was afforded by a shallow little tributary, the Pool. A few fishermen, whose huts huddled near the present site of the Liverpool Town Hall, paid tribute to the lords of the manor of West Derby. The Pool was long since filled up; West Derby has shrunk to a suburb; but the great metropolis of Liverpool, with its 775,000 population, lives today by grace of the Mersey, as did the fishing hamlet eight or nine centuries ago.

Liverpool's commercial importance began late—with the Stuart Restoration in the 17th century—and it had to outstrip first Chester and then Bristol before its position became commanding. In the latter half of the 18th century, the power loom began to make Lancashire the world's greatest cotton-manufacturing center, and Liverpool its chief port. Raw cotton is still the chief import, and the cotton goods of Manchester and other Lancashire towns the chief export, though some trade is now diverted through the Manchester Ship Canal. The woolen goods and other manufactures of the West Riding of Yorkshire also find an outlet through Liverpool.

The University of Liverpool is world-famous for one department, the Liverpool School of Tropical Medicine, which has sent many expeditions to Greece, Brazil, Central Africa, and other warm countries to study malaria, yellow fever, sleeping sickness, etc.

Birkenhead, across the Mersey from Liverpool, has immense engineering and ship-building plants, notably Laird's Shipbuilding Works, in which were built vessels for the Confederate navy during the American Civil War. It is a separate municipality from Liverpool, with a population of about 140,000 of its own.

LIVERWORTS. The next time you notice a flat, creeping, rather fleshy-looking plant, with rounded lobes to its leaflike body, examine it carefully. It is probably a liverwort—the plant from which, botanists believe, all higher forms of plants have developed. The liverworts got their name from their shape, which in some varieties looks a little like that of the human liver, and perhaps also from the fact that they were once believed to be beneficial in diseases of the liver.

They are usually of a bright green hue, and they grow most luxuriantly on wet rocks, logs, or on the ground in ravines and other moist shady places. Many are so small they are easily overlooked. They are much like mosses and are often confused with them. Others are large and conspicuous, with their upper surface green, and the lower surface covered with numerous fine white hairlike rootlets called "rhizoids." Some of these liverworts have little green cuplike organs, called "cupules" (Latin for "little cups"), containing tiny greenish balls, known as "brood buds," or "gemmae," which grow into new plants.

WHY THE LIVERWORTS HAVE THEIR UMBRELLAS UP



The Liverworts, as you learn in the article, put their "umbrellas" up, not because it is raining but because they want it to rain! In some of these umbrellas eggs are carried, in others little male cells, and during the wet weather the little cells swim from the other umbrellas and fertilize the eggs.

The liverworts have also another mode of reproducing, by growing tall umbrella-like organs, some of which (called archegonia) bear little eggs; while others (antheridia) bear very tiny actively swimming cells, called "sperms." During wet weather the sperms swim to the archegonia and there fertilize the eggs, which grow into tiny plants, rooted in the archegonium, and containing many very small brownish spores. These spores fall upon the ground and there grow into liverwort plants again, and so the cycle goes on from generation to generation.

The liverworts and mosses together compose the second great division of the vegetable kingdom, the *Bryophytes*, the liverworts forming the group *Hepaticae*.

For any subject not found in its alphabetical place see information

The GREAT MISSIONARY EXPLORER *of* AFRICA

LIVINGSTONE, DAVID (1813–1873). How does it feel to be crunched in the jaws of a lion? Dr. Livingstone, the noted British missionary and African explorer, was one of the few men who knew from personal experience and lived to tell the tale.

Soon after he began his work in South Africa he was sent to establish an advanced station in the heart of the wilderness some 800 miles northeast of Cape Town. The "charming valley" which he and his white companion chose proved to be infested with lions, which attacked the herds by day and leaped into the cattle pens at night. At a distance of 30 yards Dr. Livingstone fired two bullets into one of these ferocious beasts, severely wounding it. Then with a roar it hurled itself upon him, crushing his left shoulder in its jaws, and bearing him to the ground.



DAVID LIVINGSTONE

"Growling horribly close to my ear," wrote Livingstone, "he shook me as a terrier dog does a rat. The shock produced a stupor similar to that which seems to be felt by a mouse after the first shake of a cat. It caused a sort of dreaminess, in which there was no sense of pain nor feeling of terror, though I was quite conscious of all that was happening."

Fortunately the lion soon left Livingstone to attack his companion, and presently fell dead of its wound. Livingstone's shoulder was so badly crushed that it troubled him the rest of his life.

But neither dangers of this sort, nor hunger, fever, attacks by hostile Boers or native cannibals, the perfidy of Arab slave traders, nor any of the countless perils that beset him could dampen his ardor, or make him abandon his chosen field. His patient resourcefulness, courage, fair dealing, and Christian character laid the basis for missionary work over a large part of South and Central Africa. In addition, no other explorer ever did so much for African geography as Livingstone during his 30 years' work. He remade a large part of the map of the Dark Continent, and laid the foundation for the British title to the districts of Bechuanaland and Rhodesia.

A poor Scotch lad, Livingstone had to go to work in a cotton mill at the age of ten. With the first money that he earned he bought a beginning Latin book. Although work at the factory began at six in the morning and lasted ten hours or more, he attended night school and studied at home until he had read Vergil and Horace. At the factory he kept a book open where he could read a sentence now and then as he went about his work.

In his 20th year he was thrilled by reading an account of a missionary's labors in Asia, and, as he says, "resolved to devote my life to the alleviation of human misery." Then followed college classes in Glasgow, examination and acceptance by the London Missionary Society in the great English metropolis, the completion of his medical education in London, with studies of theology, botany, zoölogy, geology, chemistry, and astronomy—all with a view to his future life-work. At last came his arrival at Cape Town in South Africa in 1841.

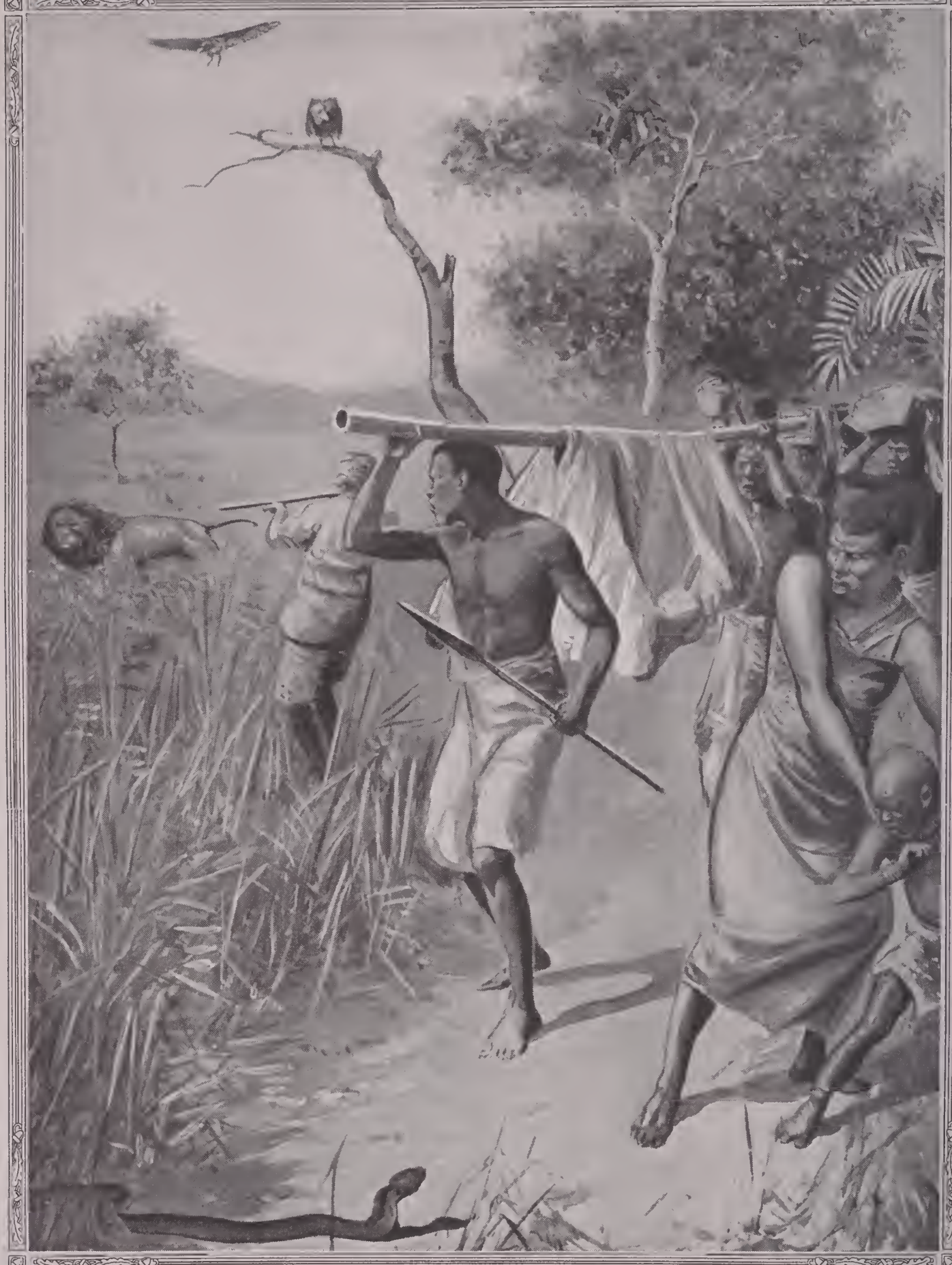
THE SHOT THAT SAVED LIVINGSTONE'S LIFE



The lion had struck down the missionary and had torn his shoulder, inflicting the wound which troubled Livingstone all the rest of his days. Another stroke of those great claws or a bite from those jaws, and Livingstone's noble career would have been ended. But the missionary's friend fired at this moment, and the beast was drawn to attack his new adversary. Weakened by earlier wounds, the lion soon fell dead.

contained in the Easy Reference Fact-Index at the end of this work

THE LAST SAD JOURNEY TO THE SEA



It was a scene worthy of the epic grandeur of Livingstone's life of sacrifice and service in the African wilderness that his body should be carried to the sea in this way by his devoted black servants through 1,000 miles of savage waste. This picture shows the perils through which his followers passed on that long sad journey. See that brave fellow in the lead, with his spear ready in case the man with the rifle should fail.

For any subject not found in its alphabetical place see information

For over 30 years Dr. Livingstone traveled up and down Africa, from the Cape nearly to the Equator, and from the Atlantic to the Indian Ocean. He discovered the famous Victoria Falls of the Zambesi, Lake Nyasa, Lake Tanganyika, Lake Bangweolo (where he afterwards died), and the upper course of the mighty Congo, there called the Lualaba and thought by Livingstone to be the upper Nile. His wife, the daughter of a missionary and herself born in South Africa, shared much of this life and his children were born in that land. His small salary and the money that he made from his books went to equip new expeditions. During the last 15 years of his life he was aided by the British government from which he held a roving appointment as consul. Had it not been for his iron constitution and his power of inspiring loyalty and affection in the natives he would have died in the first years.

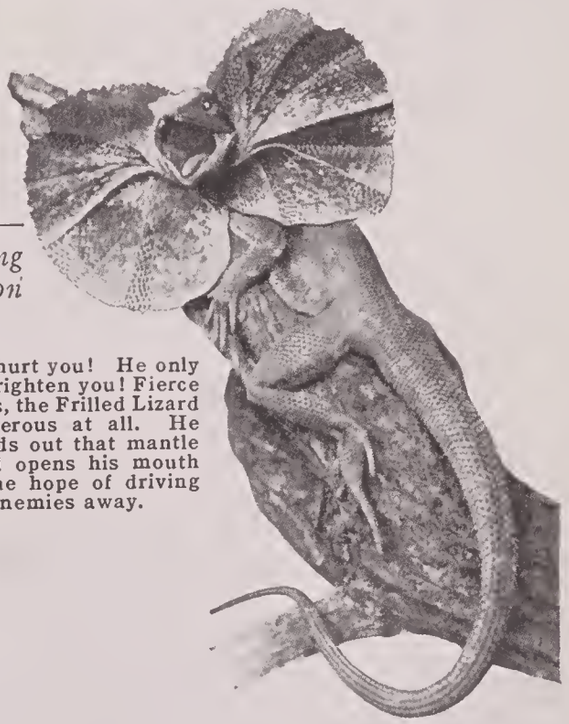
Two great objects cherished by Livingstone were the stopping of the Arab slave trade in Africa, which he called the "great open sore of the world," and the discovery of the sources of the Nile. The descriptions of the horror of the slave raids which he sent to England helped in time to stamp out this horror. He never found the sources of the Nile, though he perished in the attempt.

About six months before he died, a relief expedition sent by the New York *Herald* under Stanley (*see* Stanley, Sir Henry Morton) found him at Ujiji on Lake Tanganyika, in the midst of great privations and weakened by fever, following the desertion of some carriers with supplies and his precious medicine chest. Stanley tried to persuade him to return to civilization, but he refused. After the relief party had left, Livingstone again started west, looking for the sources of the Nile. His old enemy dysentery attacked him, with complications brought on by excessive hardships, and he grew steadily worse. On the morning of May 1, 1873, his men found him kneeling beside his cot, dead. His faithful native attendants, who loved him, preserved the body as best they could and carried it half-way across Africa to Zanzibar. From there it was taken to England and buried with all honors in Westminster Abbey. A monument has been erected on the spot where he died.

Livingstone was a pure and tender-hearted man, full of humanity and sympathy, simple-minded as a child. In his earlier years he was full of humor and fun and he was able to mellow native chiefs when harsh methods would have failed. The motto of his life was "Fear God and work hard."

The SCALY DRAGONS *of* MODERN TIMES

A Visit to Lizard Land with Its Queer Ugly Inhabitants—Their Usually Harmless Disposition—Some of Their Startling Habits, Such as Dropping Off Their Tails and Running on Their Hind Legs—Monster Lizards Eight Feet Long



He won't hurt you! He only wants to frighten you! Fierce as he looks, the Frilled Lizard isn't dangerous at all. He just spreads out that mantle of his and opens his mouth wide in the hope of driving his enemies away.

LIZARDS. If you had in a cage a specimen of each of the 1,700 different kinds of lizards that have been found in the world, it would be hard to believe that animals of such widely different shapes, sizes, colors, and habits could possibly belong to the same big group of reptiles.

You would see tiny creatures two or three inches long lying beside giants measuring seven or eight feet. Bright greens, blues, and reds would stand out among dull grays, browns, and blacks. Most of them would show four sturdy legs, with long toes, and even claws; but there would be some with only front legs, some with only back legs, and some with no legs at all. Tree-lizards, ground-lizards, underground-lizards, and water-lizards would be mingled together, some darting about with the speed of lightning, others lying sluggish and still.

Here and there you would find a sleek, slender, graceful creature, but most of them would probably impress you as misshapen, horny, repulsive monsters, like figures from a bad dream. Yet, if you judged by looks alone, you would do the lizard tribe an injustice, for in spite of their forbidding appearance, only two of the 1,700 species are poisonous—the "horrid heloderm" of west Mexico, and the "Gila monster" of southwestern United States. Many members of the tribe are not only harmless but easily tamed and exhibit a goodly degree of intelligence in captivity, learning simple tricks and answering to calls.

Present-day lizards are blood brothers of the snakes, and both orders together form the sub-class *Sauria* of the reptilian class of animals. The rela-

tionship can be traced through many details of internal anatomy and is very close, in spite of the great difference in external appearance.

Never Gets Too Hot for Mr. Lizard!

While lizards are found in nearly all parts of the earth, except the polar regions, they reach their greatest numbers and varieties in tropical lands. Most of them catch living prey, the smaller ones feeding on worms and insects, the larger ones devouring mice, frogs, other lizards, snakes, young turtles and crocodiles, fish, water-birds, and, in fact, almost any animals they can overpower.

There are some important varieties, however, that prefer a vegetable diet, notably most of the larger members of the "iguana" family of tropical America, some of which reach a length of six feet (*see* Iguana).

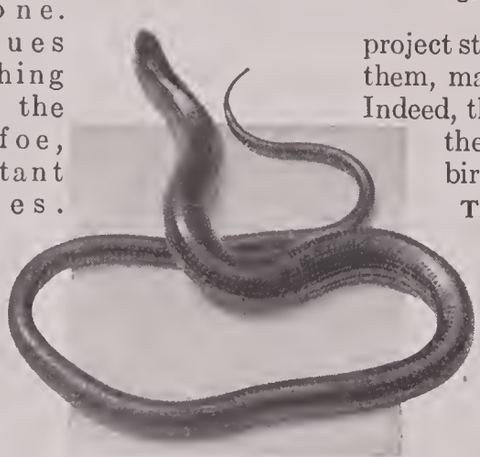
Perhaps the most amazing peculiarity found in the lizard tribe is the faculty which many of its members possess of casting off their tails. When seized by a foe from behind, the tail breaks off at one of the joints of the back bone. The severed part continues to wriggle for some time, catching the attention and satisfying the hunger of the pursuing foe, while the more important part of the lizard escapes. Some species will abandon their tails even before they are seized. Such mutilation seems to cause them no inconvenience, for they at once set about growing a new tail. Not infrequently they produce by way of consolation two or three new tails in place of the one they have lost.

Another strange practice among certain large lizards, notably the frilled lizard of Australia and the "teguexin" of the West Indies and South America, is that of running swiftly and for great distances on their hind legs. When doing this, their front legs swing back and forth like the arms of a human runner and their tails project stiffly backward and upward to balance them, making them look like strange birds. Indeed, the whole performance recalls sharply the fact that millions of years ago birds emerged from reptilian ancestors.

THE RHINOCEROS IGUANA



This member of the Iguana family gets its name from the two little horny bumps on its nose. Notice the pouch at the neck which is characteristic of the whole Iguana family.



SNAKE? NO, IT'S A LIZARD

Although this creature is called the "Glass Snake," it is really a lizard which has lost the faculty of growing legs.

The "Flying-Dragons" of the Malays

The nearest thing to flying found among the lizards, however, are the long sailing leaps from tree to tree performed by the small "flying-dragons" of the Malay countries. The "wings" of these creatures are unlike any other animal organs, for they are formed by the outward extension of the ribs, which are connected by thin membranes of skin. When at rest, they lie close to the creature's sides, but when a leap is made, they spread out like fans, supporting the lizard like a parachute as it glides through the air. Often these "gliders" are brightly colored like the wings of a butterfly.

The frilled lizard mentioned above gets its name from the broad collar of loose skin it wears around its neck, which it spreads out like an umbrella when frightened or angered, at the same time opening its mouth wide and hissing most venomously—all of which is pure bluff. Such scarecrow tricks are common among lizards. The "hooded basilisk," which is named after the fabled

ONE OF THE BIG "MONITOR" FAMILY



The Monitor lizards are among the largest of their family. While they never seek trouble, they have fierce tempers when attacked, biting their foes and lashing them with their long tails.

monster that was supposed to strike men dead with its glance or with its breath, is a conspicuous example of such "frightfulness." Being about three feet long, and possessing jagged crests which it can raise at will on its head, back, and tail, this harmless creature is an object of terror to the native children of Central America.

But we must not imagine that all lizards are equally placid in their disposition. Though non-poisonous and inclined to mind their own business, some of them are fierce fighters and biters when annoyed. This is particularly true of the "monitor" family, whose members are scattered through Africa, Arabia, southern Asia, and Australia. One water-loving species (*Varanus salvator*) sometimes attains a size of more than eight feet—the largest of the lizard tribe. Like all the monitors, it is equipped with a long whiplike tail with which it lashes and cuts its assailants when it is unable to reach them with its sharp and powerful teeth.

In contrast with this vigorous and short-tempered creature are those most helpless of all lizards, the "glass-snakes," sometimes called "blind-worms" or "slow-worms," and the strange "amphisbaenas." Both are devoid of legs, although some possess useless external flaps in place of feet. The former is, of course, neither a snake nor a worm, nor is it blind. Its small bright eyes are equipped with eyelids, a thing unknown among true snakes. The "glass" part of its name arises from the fact that it becomes rigid when captured and breaks off at the tail if not handled very gently. Even more unlike the typical lizard is the amphisbaena, which has eyes and ears both concealed by skin growths, which lives in the ground, and which can move backward or forward with equal ease like an earthworm.

Although most of the lizards have no voice beyond an angry hissing, the night-loving "gecko" family is distinguished for its ability to emit a variety of cries, all resembling more or less the sound from which they derive their name. The geckos are small creatures, very useful for the number of insects they destroy. Some are sand-runners, others tree-dwellers, and a few varieties penetrate dwellings in search of food. These have feet equipped with tiny pads and hairs which enable them to climb up a pane of glass or walk on a smooth ceiling.

While the geckos have been in many lands unjustly persecuted from the popular belief that they spread mysterious poisons, another group of small lizards, the "skinks," have been regarded from the earliest times as possessed of equally mysterious medicinal properties. The head and feet of the common sand-burrowing skink were preserved in wine and imported in great quantities to ancient Rome. The Arabs of today still use them as medicine and food. Nor is this the only example of lizards being eaten by man, for the iguanas of America and many Australian, Asiatic, and African species are highly relished by the natives.

Among the best known of North American lizards are the poisonous "Gila monster" and the gentle friendly "horned toad." The former, which sometimes reaches a length of two feet, was first found in the Gila River valley in Arizona. Its sluggish body is marked with big orange blotches and rings on a black background. The poison-sacks lie near the root of its grooved teeth, and its bite quickly kills the small animals on which it preys. In rare cases it has been fatal to man. Its near relative the "horrid heloderm" bears yellow instead of orange spots.

The "horned toad," so called because of its flat, squatty, toadlike body, dwells throughout the dry plains and deserts of the western and southwestern United States and in Mexico. It is covered with a multitude of

UP AND AWAY!



This rear view of a Frilled Lizard shows the curious way in which it runs on its hind legs, swinging its arms like a human runner, and throwing its tail from side to side to balance itself.

THE VILLAINS OF LIZARD LAND



These Gila Monsters, and their cousins the "Horrid Heloderms," are the only poisonous kinds of lizards. They dwell in the dry southwestern parts of the United States and in Mexico.

short sharp spines, particularly about the head, which protect it chiefly against being swallowed by snakes. These small creatures make interesting pets, feeding readily on flies and ants and drinking large quantities of water if it is sprinkled into their cages like rain drops. They belong to the family of iguanas, as does also the pretty little red-throated anolis which lives in Cuba and in some of the Southern states.

Most of the other common lizards of North America belong to the group of the "swifts," so named because of the agility of many of them.

Two close relatives of the lizard tribe, the "chameleon" and the "tuatara" of New Zealand, are of immense interest to scientists. The story of the chameleon is told elsewhere (*see* Chameleon), but the tuatara (*Sphenodon*) deserves mention here because this singular creature is the sole surviving member of a group of reptiles otherwise extinct millions of years ago. The bodily structure of this "living fossil" has given science a key to the evolution of the whole reptile group, for it retains traces of many of the primitive bodily forms, notably a well-developed "third eye" buried beneath the skin of its forehead, which is a remnant of the third eye actually possessed and used by certain prehistoric reptile ancestors. The group which it represents is thought to have been the parent stock of all lizards.

NICKNAMES IN THE SKINK FAMILY



You'd think the Skinks were as fond of nicknames as boys are. For instance, Stump-Tailed, Broad-Toothed, Snake-Eyed, Three-Toed, and Five-Lined. This is the Five-Lined Skink—three lines on the back and one on each side.

Lizards are "cold-blooded" creatures, like all reptiles. Some lay eggs similar to hen's eggs, varying from 1 to 20 at a time, but others produce living young. Their skin, like that of snakes, is normally covered with scales, and from time to time they shed the thin, horny, outside coating. Many of them possess, like the chameleon, the faculty of changing color rapidly. In temperate climates they pass the winter in a torpid condition in holes.

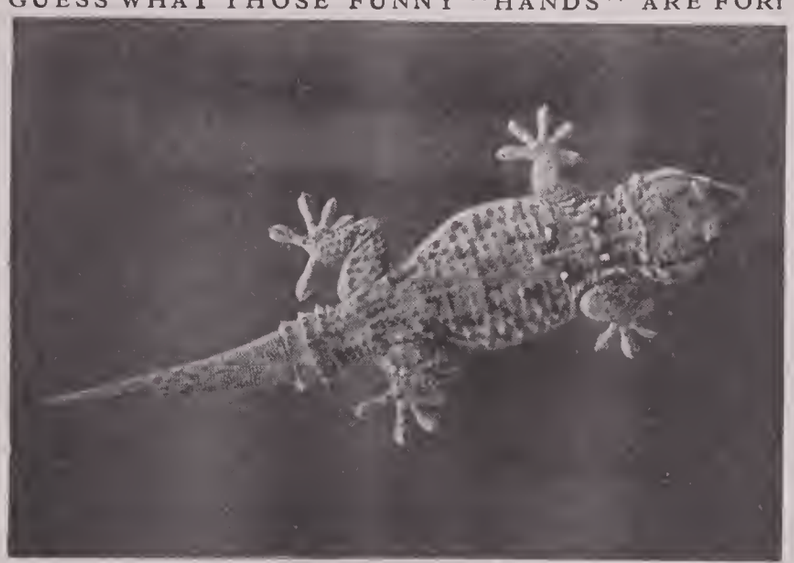
The family history of the lizards is particularly interesting because of its many relationships with the birds and mammals. You might think at first that the lizards are dwarfed descendants of the prehistoric monsters that once roamed the earth (*see* Animals, Prehistoric). But this is not the case. Nature started with the original reptiles evolved from amphibians (*see* Reptiles) and from them developed the monsters. They proved unable to survive. However, nature had gone back to the primitive reptile stock, which was still in existence, and "tried again." The second effort produced small, fleet animals, capable of surviving under modern conditions. These "second effort" animals were the lizards.

THE "COMMON" LIZARD



The young of this species, which is common in Northern Europe, are born alive.

GUESS WHAT THOSE FUNNY "HANDS" ARE FOR!

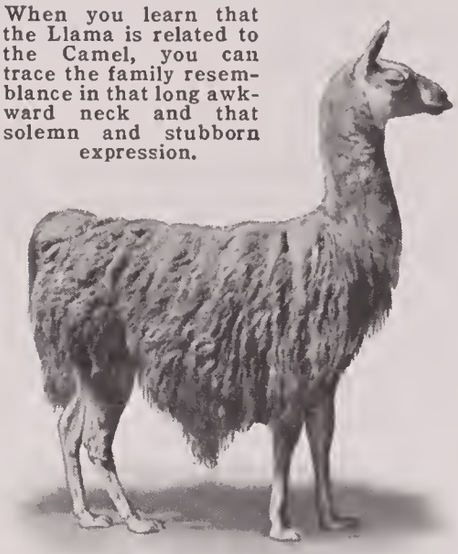


This little Gecko can walk up and down or across a ceiling just like a fly. He has disks on the ends of his "fingers" and toes, which make this possible.

At about the same time the lizards were appearing, nature was also producing (from much the same type of primitive reptiles, according to one theory) the first birds and the early mammals.

Some authorities regard the lizards as belonging to an order of reptiles called *Squamata*, which includes also the snakes. Others place them in a separate order, *Lacertilia*, divided into three sub-orders—*Geckones*, *Chamaeleontes*, and *Lacertae* and combine this order with the snakes (*order Ophidia*) to form the sub-class *Sauria* of the class *Reptilia*.

Llama. Among the most grotesque of all the larger animals is the hissing spitting llama of South America. Although related to the camel of the Old World, the llama has no hump. Its wool is not valued as is that of the alpaca and vicuna, its near relatives, which like the llama live in the Andes of Bolivia, Peru, and Chile; for llama wool is coarse and rough and is suitable only for twine and very coarse cloths. The male llama is chiefly valued as a beast of burden and the females are useful for their milk and meat, which resembles mutton. The llama is a domesticated form of the wild guanaco which is still found in the Andes.



When you learn that the Llama is related to the Camel, you can trace the family resemblance in that long awkward neck and that solemn and stubborn expression.

When the Spaniards conquered Peru in the 16th century, they found the Incas of that land using hundreds of thousands of llamas as riding animals and beasts of burden. In the whole New World these were the only domesticated animals except dogs, and the lack of such helpers to man as the horse, ass, ox, sheep, and pig, was one of the chief reasons why the New World lagged behind the Old in civilization. The Spanish conquerors continued to use the llamas, and long strings of these animals in charge of a few native drivers were soon passing back and forth carrying silver by the narrow mountain trails from the mines to the coast. Until the middle of the 19th century these remained almost the only means of transportation in the Andes Mountains.

The llama is about three feet high at the shoulders and is capable of carrying 120 pounds at the leisurely rate of 12 miles a day. If treated well, they are willing and docile. They gather their own food, are hardy, and can travel over places too rough and steep for any other burden-bearing animal. If overloaded, they will lie down and refuse to move. When disturbed, they spit a ball of food and saliva at their tormentor. Scientific name, *Lama glama.*

The "LITTLE WELSHMAN," *Britain's Great War Minister*

His Education by His Uncle, the Village Cobbler Whose Name He is Proud to Bear—How, as One of England's Greatest Statesmen, He Fulfilled the Ambitious Dream Recorded in a Boy's Diary

Lloyd George, David (born 1863). At the age of 17 this Welshman, who divides the honor with the younger Pitt of being Britain's greatest war premier, visited the House of Commons for the first time. He wrote in his diary, "I will not say that I eyed the House of Commons in the spirit in which William the Conqueror eyed England on his visit to Edward the Confessor," but already he was dreaming of future political greatness.

His own hard youth had made him a radical in politics. Left in poverty at the age of three by the death of his schoolmaster father, William George, he was reared and educated by his mother's brother—Richard Lloyd, a village cobbler of North Wales—in whose honor he bears the name "Lloyd" along with that of his father. He studied law and at the age of 21 was admitted to practice as a "solicitor." Almost at once he made his mark by winning cases for tenant farmers against their landlords, as well as by his earnestness in defending the rights of Welsh "Nonconformists" against the claims of the Church of England. And soon he was elected to Parliament as a Liberal from the Welsh constituency of Carnarvon, a seat which he was to hold for over 30 years.

In Parliament he dared to cross swords even with his leader, the great Gladstone. He was afraid of no one; he was quick and biting in reply, and he speedily won attention. When the South African War came on, he showed his courage by taking the unpopular side and going up and down the country making speeches against the war, on the grounds that it was due to imperialistic designs against the Boer republic. He was mobbed in Birmingham and only escaped from the building in the disguise of a policeman.

When the Liberals came into power at the end of 1905, Sir Henry Campbell-Bannerman, the new prime minister, offered Lloyd George one of the minor places in the Cabinet as head of the Board of Trade. In this office he put through a shipping act that helped sailors, and in settling a great railway strike he revealed a capacity for conciliation which no one had suspected, but which was to prove a characteristic of all his statesmanship.

When Asquith in 1908 succeeded Campbell-Bannerman as prime minister, he asked Lloyd George to take the second place in the Cabinet, that of chancellor of the exchequer. The friend of the poor now had his chance. It was his first duty to bring in the budget, that is, the annual estimate of expenditures and proposed taxes to meet government expenses. To provide funds for the Old Age Pension Act, which he helped to pass, Lloyd George proposed many new taxes which took the burdens of taxation from the shoulders of the poor and put them on those of

the rich. "I made up my mind that in framing the budget which was in front of me," he said, "no cupboard should be barer, no lot harder to bear." This budget was much more than a financial proposal for the year; it was a program of social change, for it would break up the great landed estates by taxing the "unearned increment" in land values (*see* Taxation). His enemies called it a revolution.

The budget made Lloyd George the idol of the poor, but it also made him the most hated man in England by those whose lands and pocketbooks were affected. The House of Lords rejected it, and then the Prime Minister gave notice that the government proposed to limit the power of the Lords to reject legislation passed by the Commons. A great struggle followed and two elections were held within a year. Lloyd George took a leading, if not the chief, part in this struggle, which produced a change in the British constitution as profound as that created by the Reform Act of 1832. But the Lords were at length with great difficulty defeated. The Parliament Act of 1911 destroyed the power of the Lords to reject a money bill (such as the budget), but it still left them the possibility of holding up ordinary legislation for two years.



DAVID LLOYD GEORGE

Immediately Lloyd George produced a new program of social legislation. The chief measure passed gave working men cheap insurance against sickness and unemployment, with free medical service, payment of partial wages during periods of disablement, hospitals for tuberculosis, maternity benefits for their wives, etc. This legislation entitles Lloyd George to rank as one of the greatest practical social reformers in history and caused him to be regarded for many years as the champion of the working classes of England.

From the time of the Boer War Lloyd George had been regarded as a pacifist. He was a "little Englander," and was reluctant to see money spent on armaments and imperialistic expansion which might be spent in alleviating misery; for he looked forward to a time "when poverty with its wretchedness and squalor will be as remote from the people as the wolves which once infested the forests."

When the World War broke out in 1914, many people expected that Lloyd George would resign. But after Belgium was invaded he came out in unmeasured terms against Germany's aggression. As chancellor of the exchequer it was his first task to provide the money—"silver bullets"—without which Britain could not hope to win. He gained the confidence of the banking and landed interests, hitherto his bitterest enemies. He was one of the first to realize that Britain was hopelessly outdistanced by Germany in the quantity of shells manufactured, and was given the new post of minister of munitions. By his enthusiasm and dynamic energy he organized the munitions manufacture in every corner of the kingdom, and soon the British army was as well equipped as Germany with shells for the battlefield.

But Lloyd George became more and more restive under Asquith's government. He felt that his old chief was not pushing the war hard enough. He became certain that Britain must have a more forceful war leader, and he was strongly supported by Lord Northcliffe, proprietor of the London *Times* and other papers, in demanding a change of government. In December 1916, he overturned his chief and himself became prime minister. In his new capacity he gathered around him trained executives and gave drive to the war. He stood out relentlessly

against the talk of a "peace by compromise," rallied the faint-hearted, pressed the supplies of munitions, and made over the army staff.

The outcome of the war abundantly justified his course. During most of the war a coalition based on a union of the Liberal and Conservative parties had carried on the government, with the Conservatives becoming more and more prominent. In the "khaki election" of November 1918, Lloyd George obtained a House of Commons containing a large majority of his supporters; but it was made up largely of great manufacturers and business interests, of "profiteers," its enemies said.

At the Peace Conference Lloyd George steered no consistent course. Now he was with France in her efforts to destroy Germany once and for all; now he was with President Wilson in his efforts for a peace based upon reconciliation and the rights of nationalities. Here, as earlier in his career, he showed his genius for conciliating and bringing to a compromise agreement persons of widely opposing views. Britain gained materially by the Conference, even though unable to get those great indemnities from Germany which Lloyd George had recklessly promised the electors.

In the troubled times which followed the Peace, Lloyd George faced problems connected with Ireland, labor, and reconstruction which were as appalling as those of the war. At the same time the morale of the British people was relaxed, as was the case in all the warring lands. The regular Liberals could not forgive his ousting of Asquith, and the Conservatives had little sympathy with his social reforms. His majority in Parliament remained unshaken, largely because there was no other leader in sight who could hope to do any better in reconciling conflicting claims, and Lloyd George continued in power as a man without a party.

MR. LOBSTER SHOWING HIS "TEETH"



The Lobster does a good deal of chewing with his claws. You can see the difference between his two claws in the top picture. The heavy, blunt-toothed claw is for crushing, and the sharp one is for cutting his food. Notice how the lobster below is labeled with a copper ticket. He is turned loose with this ticket on, which asks any fisherman who may capture him to report it to the United States Fish Commission. This is one way the experts study the movements and habits of lobsters.

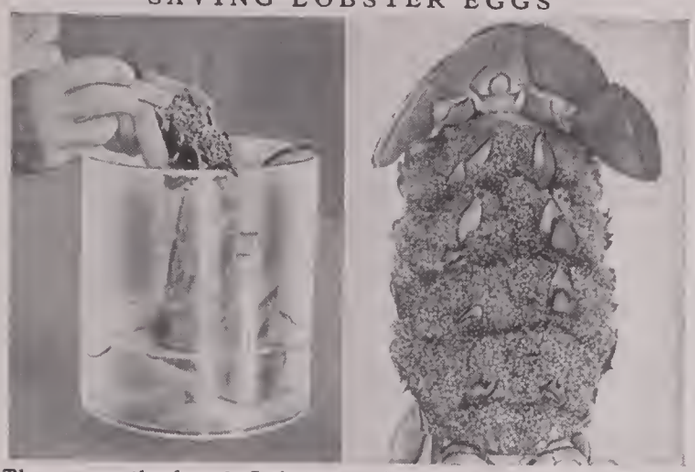
Lobster. What a curious creature the lobster is, with his powerful claws and long antennae, his eyes mounted on the ends of movable eye-stalks, and his armor-like shell of bottle green covering body and tail! Green? Yes, for it is only when the lobster is boiled or otherwise cooked that he turns the brilliant red which formerly caused the red-coated British soldiers to be called "lobster backs."

The lobster belongs to the crustacean family and is a big brother to the crawfish and shrimp. Lobsters are found in many parts of the world, and there are several different species, varying only slightly from the American lobster, which is found on the Atlantic coast from Delaware to Labrador, and is most abundant on the shores of Maine and Nova Scotia. Its tail is made up of six jointed segments; it breathes by means of many pairs of feather-like gills inclosed on each side of the body under the shell of the head and thorax; and its large powerful claws are used, the blunt-toothed one for crushing and the sharp-toothed one for cutting its food. Behind the large claws are four pairs of walking legs, the first two pairs of which end in small claws. Each joint of the abdomen has a pair of swimmerets. The last joint has expanded plates which assist the animal when it swims backward.

The lobster lives sometimes in shallow water near the shore and sometimes in deep water, but it prefers a rocky bottom and reaches its greatest size in such conditions. Lobsters eat animals living and dead, and vegetable matter to a less extent. They sometimes even eat each other. They are well protected by their hard shells and powerful claws and their habit of burrowing down among the rocks, but when they are small, or when they are molting, as they do once a year, great numbers are destroyed by fishes.

The female lobster produces a great many eggs, from 3,000 to 100,000 according to her size and age. These eggs are attached to the swimmerets on the

SAVING LOBSTER EGGS



The reason the female Lobster carries so many eggs is that in a state of nature comparatively few have a chance to hatch and grow into adult lobsters. But at the lobster hatcheries these eggs are collected and protected so that about half of them hatch into healthy young lobsters, able to protect themselves. This is one way of preventing lobster extermination.

under side of her tail by a sort of glue, and the female is thus called a "berry lobster." After 11 months the eggs hatch into small larval forms, and for six to eight weeks these remain as free-swimming larvae, molting five or six times with various changes of color. The adult form is attained when the lobster is about three-quarters of an inch long, and at this stage it sinks to the bottom near the shore and begins its lobster life. As a general rule a lobster 10 to 12 inches long is about five years old. Great age and size are sometimes attained, individuals weighing

IF THE LOBSTERS ONLY KNEW!



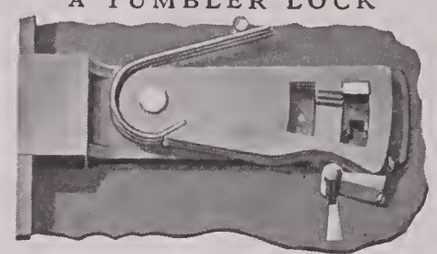
You see the mouth of this lobster trap is like a funnel so that the lobsters can easily swim right in through the hole. But when they try to get out, they only bump around the sides without realizing that, if they would only aim for the point of the funnel they could easily get out.

more than 30 pounds having been found; but one weighing 25 pounds is uncommon.

The American lobster early became a favorite article of food, and lobster fisheries have existed on the Massachusetts coasts for more than a century. The method of capture is simple. A slatted box or barrel, with a funnel-shaped opening of coarse netting in the ends is baited with fish, weighted with a flat stone, and sunk to the bottom on a quarter-inch line. The lobster fisher has his "lobster pots" set at intervals and visits them once a day to remove the lobsters and replenish the bait. Besides being sent fresh to many parts of the country, large quantities of the lobster meat are canned, especially at Portland, Me. The British and United States governments maintain extensive lobster hatcheries, to keep lobsters from being exterminated by the fisheries.

Locks and Keys. Keys a foot long and weighing as much as a pound were common in the Middle Ages, and the warden of a dungeon or a castle carried at his belt a jangling weight, which in emergencies could become a terrifying weapon. Yet the great locks which were opened by those giant keys were not as secure as the delicate modern locks fitted with keys that tuck away snugly in a vest pocket.

A TUMBLER LOCK



The spring tumblers hang on a pivot and fit over that small oblong projection from the bolt in the upper right-hand corner. When the proper key is turned, the tumblers are each raised just the amount necessary to release that bolt projection. Then, as the key is further revolved, it catches in the V-shaped cut in the bolt, which is just visible behind the tumblers and pushes out the bolt. When the bolt projection reaches the second oblong notch at the left, the tumblers fall into place again, and the bolt is locked.

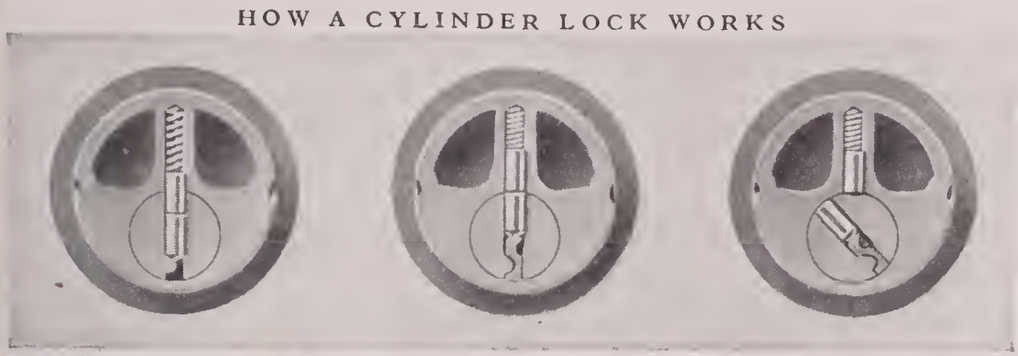
The locks of today may be divided into two general classes—warded locks, and tumbler or lever locks. The warded lock has on the inside a number of projections or ridges called "wards," which prevent the turning of the key unless the grooves or cuts of the key coincide with the wards. This is the type of lock used in ordinary drawers, wardrobes, desks, etc. The tumbler lock—an improvement on the warded lock—was probably invented by the Chinese, and its fundamental principle was employed in an ancient Egyptian lock. Instead of wards, this lock has small movable levers or pegs called "tumblers." This lock can be opened only by a key whose indentations or "bittings" will raise each tumbler exactly to the proper height.

It was not until the latter part of the 18th century that these locks were substantially improved upon. It was then that the English Bramah lock came into use. This consisted of a number of sliding tumblers contained in a tube or cylinder projecting from the lock—a construction by which it was made more secure and harder to pick than other locks.

The Bramah lock, in turn, was improved by the American inventor Linus Yale, Jr. (1821–1868), who perfected his "pin-tumbler" or "cylinder" lock universally known today as the Yale lock. It is a cylinder within a cylinder. It opens with a

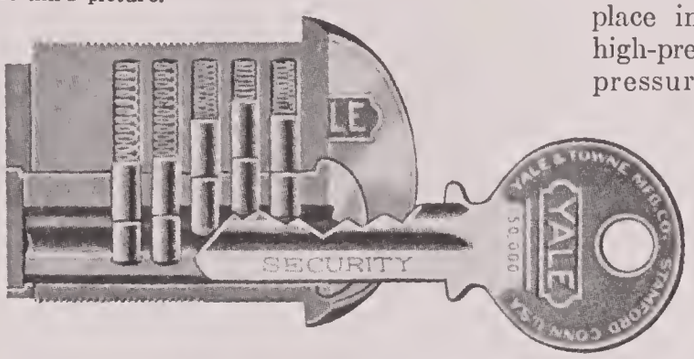
flat key, and cannot be opened by any key differing from the true key by even so little as one-fiftieth of an inch in the height of any notch.

HOW A CYLINDER LOCK WORKS



In the first picture we see a cross-section inside the lock, showing how the smaller cylinder, fitting within the larger cylinder, is kept from revolving by a "pin-tumbler," which is thrust down by a tiny coiled spring. This pin-tumbler is cut in two near the middle. In the next picture we see what happens when the key is inserted — the pin-tumbler is raised until the "cut" comes at the junction point of the two cylinders. This permits the inner cylinder to revolve, as shown in the third picture.

But even the best of key locks can be opened either with a skeleton key—a key with most of its blades cut away to avoid all the wards—or with some other device of the burglar or the expert lock-picker; and it remained for Yale to invent the keyless dial or combination lock so widely used today for safes and vaults. This lock is operated by a knob or handle which is turned back and forth certain "combinations" of distances known only to the proper persons. The rotation of the knob, of course, merely sets the wheels or tumblers in the mechanism of the lock so that it will slip open.

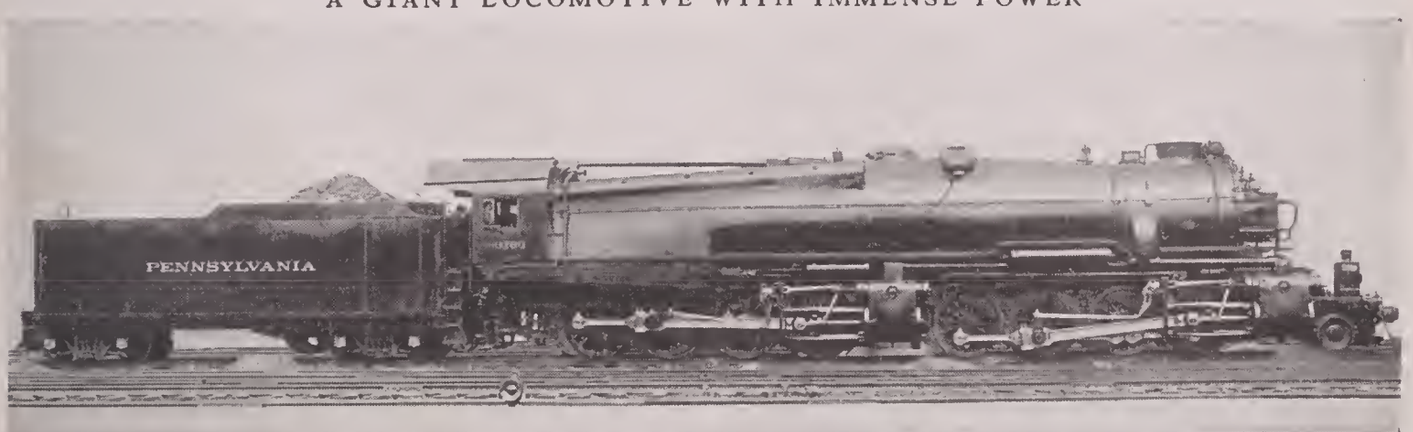


Here we see the cylinder lock from the side, and cut away to show the mechanism. This is a "five-tumber" lock, each tumbler working like the one described in the first pictures. As the key goes in, the tumblers are pushed up by the wedge-shaped point. When the key is all the way in, if it is the proper key, the five tumblers will all rest in its notches in such a way that the tumbler cuts are all directly in line with the cylinder division, and the inner cylinder can turn and pull back the bolt.

Finally, improvements on the combination lock brought forth, in 1857, the greatest lock of all—the time locks, in which a timepiece is set with the lock, and the clockwork operates the mechanism. Thus the lock can only be opened at a certain time.

Locomotive. As the name implies, a locomotive is a steam engine so arranged with wheels as to drive or move itself, especially on an iron or steel track. As a steam engine the locomotive has a number of special features (*see* Steam Engine). It carries its furnace and boiler with it, and must also be supplied with an auxiliary car or tender for carrying water and fuel. The engine is double, that is, there is a high-pressure cylinder with piston on each side of the locomotive. Many modern locomotives are also compound steam engines, that is, the steam expansion takes place in two cylinders, a high-pressure and a low-pressure cylinder. The steam-pressures commonly used are from 150 to 200 pounds per square inch. The oscillating straight-line motion of the piston is changed into the rotary motion of the driving wheels by the usual mechanism of a cross-head and crank. The engine must be reversible. This is accomplished by a link-motion due to George Stephenson, by which the connection of the valve mechanism with the driving parts can be shifted through an angle. Another requirement of the locomotive is the development of a large power in a limited space and with a limited weight. This

A GIANT LOCOMOTIVE WITH IMMENSE POWER



This is an example of the tremendous size reached in building modern locomotives. It has four cylinders, two on each side, and sixteen driving wheels, eight on each side. Such engines are used to haul great freight trains, as you might guess by the comparatively small size of the wheels, which are designed to give power rather than speed. Fast passenger engines are much lighter and have huge "drivers."

means the burning of a large amount of fuel per square foot of grate area, and requires forced draft. It is accomplished by exhausting steam directly into the smoke-stack.

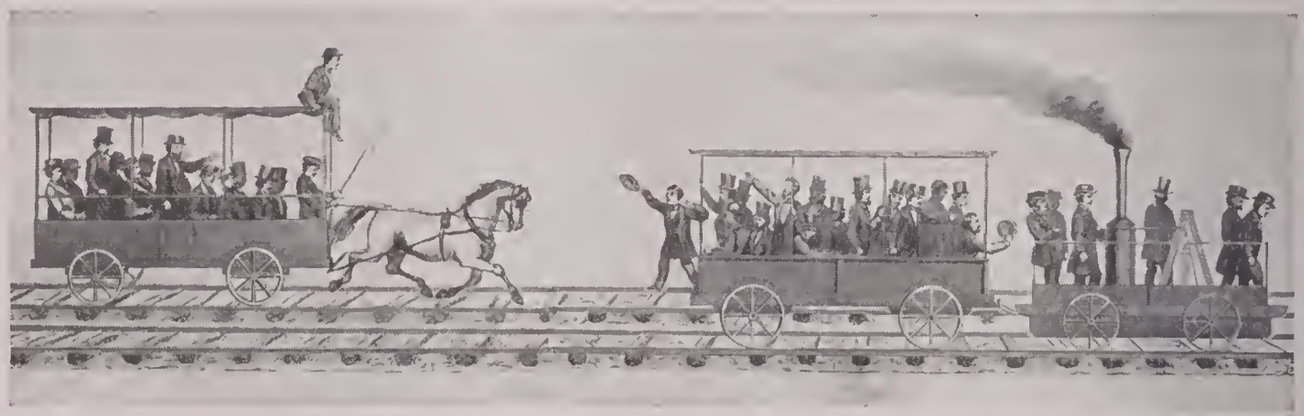
The American and European locomotives differ little as steam engines, but present quite different external appearances. The large cab for the engineer, the pilot or "cow-catcher," the headlight, the prominent whistle and bell, are striking external features of the American locomotive. The frame of the engine and boiler is also quite different, that of the European locomotives being more rigid than can be used on American railroad tracks.

Like all great inventions, the locomotive grew through the slow accumulation of improvements made by different inventors. Men in England and France were working on the idea as early as the middle of the 18th century. Some of these were designed to run on the ordinary highways, and so were forerunners of the automobile (*see* Automobile). Richard Trevethick, in England, about 1802, was the first to make an engine which traveled on rails, but only at the rate of five miles an hour. William Hedley improved on this (1813) with his "Puffing Billy," so called from the noise which it made.

The first successful locomotive, however, was due to George Stephenson, and was used to haul coal for the Killingworth colliery in 1815 (*see* Stephenson). In 1825 at the opening of the Stockton and Darlington railroad, an English line of 37 miles, a Stephenson engine weighing eight tons and capable of 16 miles per hour was used. Of the early locomotives, the *Rocket*, produced by Stephenson's son Robert, was one of the most famous. At a competitive trial of locomotives in 1829 this engine showed a speed of from 25 to 30 miles per hour.

These early locomotives were pigmies compared with the heavy high-speed machines of to-day. Speeds of 100 miles per hour have been frequently exceeded in the last few years by express locomotives. One of the largest locomotives in the world, in use on the Erie Railroad for hauling freight trains over steep grades, weighs over 425 tons. This has hauled a train of 250 loaded cars, more than a mile and a half long. The largest locomotive works in the world are the Baldwin Works at Philadelphia, Pa.

RACE BETWEEN HORSE-CAR AND LOCOMOTIVE IN 1830



The first locomotive engine built in the United States was the "Tom Thumb," constructed in 1829 on an original principle by Peter Cooper, of New York. It was not much larger than the hand-cars that workmen use on the tracks today, and its upright boiler was no bigger than the kitchen boiler attached to an ordinary coal range. But it did the work, as is shown by the following account of a trip made on Aug. 28, 1830, on the newly laid tracks of the Baltimore and Ohio railroad between Baltimore and Ellicott's Mills, and back:

"Mr. Cooper's success was such," writes one of the passengers, in speaking of the earlier tests, "as to induce him to try a trip to Ellicott's Mills, on which occasion an open car, the first used upon the road already mentioned, having been attached to the engine, and filled with the directors and some friends, the speaker among the rest, the first journey by steam in America on an American locomotive was commenced.

"The trip was most interesting. The curves were passed without difficulty, at a speed of 15 miles an hour. The grades were ascended with comparative ease. The day was fine, the company in the highest spirits, and some excited gentlemen of the party pulled out memorandum books, and when at the highest speed, which was 18 miles an hour, wrote their names and some connected sentences, to prove that even at that great velocity it was possible to do so. The return trip from the Mills, a distance of 13 miles, was made in 57 minutes.

"This was in the summer of 1830, but the triumph of this Tom Thumb engine was not altogether without a drawback. The great stage proprietors of the day were Stockton and Stokes; and on that occasion a gallant gray, of great beauty and power, was driven by them from town, attached to another car on the second track—for the company had begun by making two tracks to the Mills—and met the engine at the Relay House, on its way back. From this point it was determined to have a race home; and, the start being even, away went horse and engine, the snort of the one and the puff of the other keeping time and time.

"At first the gray had the best of it, for his steam would be applied to the greatest advantage on the instant, while the engine had to wait until the rotation of the wheels set the blower to work. The horse was perhaps a quarter of a mile ahead, when the safety-valve of the engine lifted, and the thin blue vapor issuing from it showed an excess of steam. The blower whistled, the steam blew off in vapory clouds, the pace increased, the passengers shouted, the engine gained on the horse, soon it lapped him. The lash was plied—the race was neck and neck, nose and nose. Then the engine passed the horse, and a great hurrah hailed the victory. But it was not repeated; for just at this time, when the gray master was about giving up, the band which drove the pulley which moved the blower, slipped from the drum. The safety-valve ceased to scream, and the engine, for want of breath, began to wheeze and pant.

"In vain Mr. Cooper, who was his own engineer and fireman, lacerated his hands in attempting to replace the band upon the wheel. In vain he tried to urge the fire with light wood. The horse gained on the machine and passed it. Although the band was presently replaced, and steam again did its best, the horse was too far ahead to be overtaken, and came in the winner of the race. But the real victory was with Mr. Cooper, notwithstanding. He had held fast to the faith that was in him, and had demonstrated its truth beyond peradventure."

Locust. The "17-year locust" is a *cicada* (*see* Cicada), but the name locust is also applied to the short-horned grasshoppers. Those are the "locusts" mentioned in the Bible, and which still appear at times in vast numbers in oriental countries, and sometimes in the Western states. A column of flying locusts has been seen in India estimated to be several hundred miles long and dense enough in some places to obscure the light of the sun. (*See* Grasshopper.)

Locust tree. In Maytime the locust tree flaunts its plumelike clusters of creamy white or reddish flowers, scenting the air with their honey-sweet perfume, while the graceful sprays of its pale green leaves form a beautiful setting for the delicate blossoms. In September pods appear on the flower stalks. Varying from a spreading shrub to a slender tree of 70 to 80 feet in height, the locust holds a place among the most beautiful park and forest trees of eastern North America. There are a number of different species. The black or yellow locust, found from Pennsylvania southward to Georgia and westward, has white blossoms. The clammy locust, which is so called from its sticky clammy buds and branchlets, thrives farther south and bears very showy pink flowers. The rose or moss locust is rather shrubby in habit of growth, and its blossoms are especially large and deep rose in color.

THE LOCUST TREE AND ITS PODS



This is a fine Locust tree some three feet in diameter, as you can see by the foot rule attached to the front of it. On the right is a branch with the beautiful leaves and the seed pods. The pods have a sweet pulp in them that boys, as well as wild animals, are often very fond of.

The name "locust" is also given to several trees which are not true locusts. The honey locust, common from New York southward and westward, is a member of the genus *Gleditsia*. The flowers are greenish-white, and are less conspicuous than those of the preceding species. The tree is covered with a mass of airy leaves, dark green above and yellowish-green beneath. The pods contain a sweetish edible pulp, which is consumed with avidity by the small boy. The carob tree, a European species flourishing on the Mediterranean shores, bears a pod known as St. John's bread which is widely used as food for stock and sometimes as human food. These pods are dried and exported, and may occasionally be purchased at our fruit stands.

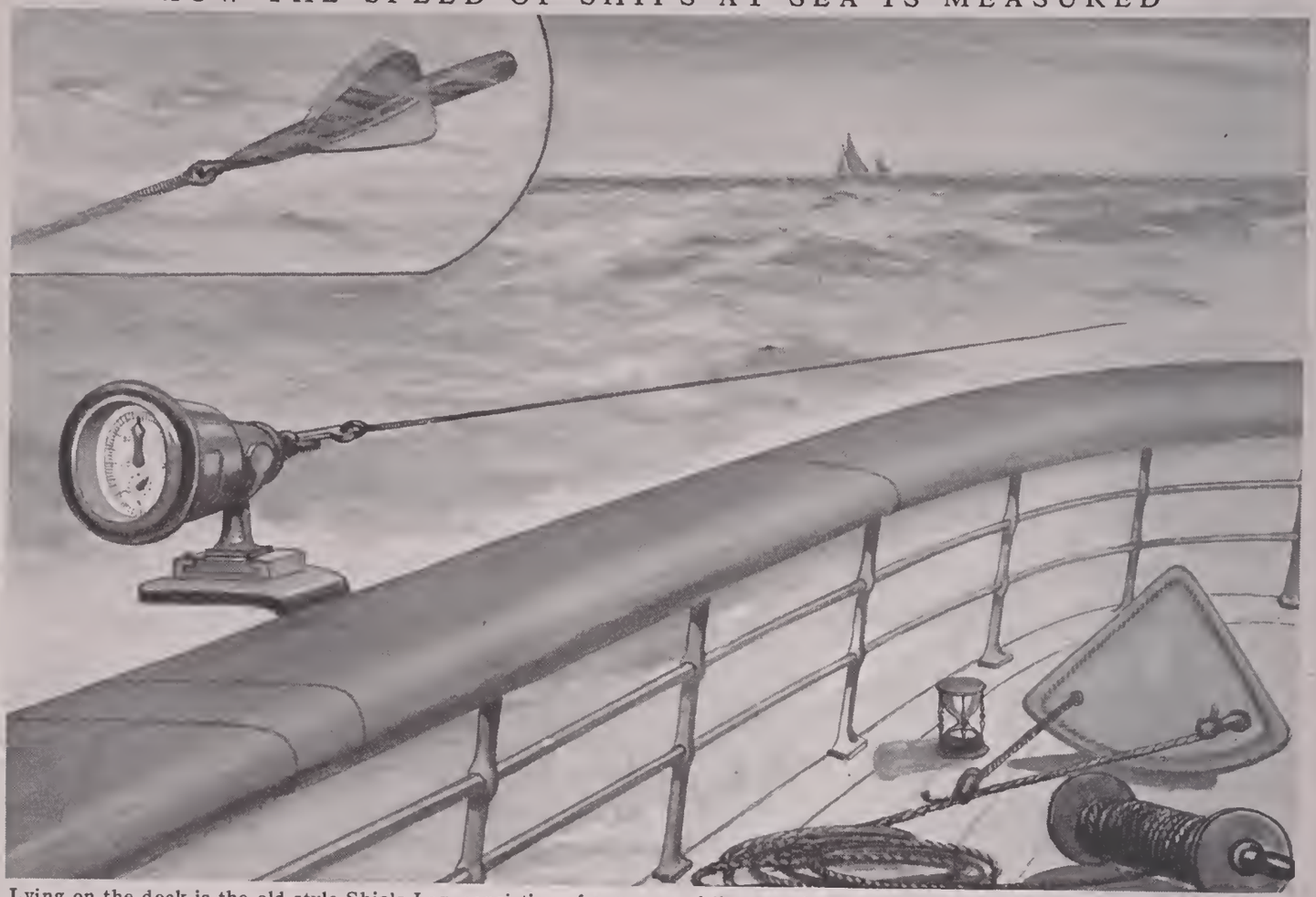
Scientific name of the black or yellow locust, *Robinia pseudacacia*. Bark reddish-brown, rough and broken in ridges. Leaves compound, alternate, with leaf-stalks hollowed at base and covering buds of the succeeding year, odd-pinnate with from 11 to 25 leaflets. Flowers white, fragrant, growing in loose axillary racemes. Pods linear, glabrous, containing from 4 to 6 brown seeds, remain on trees over winter.

Log, Ship's. Speed of a vessel is reckoned by a device called a ship's log. The older type of log consists of a long line marked into equal sections with knots of colored cloth. To the free end is fastened the log-chip, a small flat board shaped like the sector of a circle and loaded with lead along the rounded edge. When this is hurled far out over the stern, the lead balances it so it floats point upward and remains practically stationary. As the ship plows on the logline is allowed to unwind itself freely from its reel. At the end of a fixed time the log-chip is hauled in again. The number of knots on that part of the logline which has passed overboard is counted and in this way the speed at which the ship is running is figured out.

Commonly the knots are 47.33 feet apart, and the log is allowed to run for 28 seconds. With this arrangement the number of knots unwound indicates the number of nautical miles per hour the ship is traveling. This explains why the speed per hour of a ship is always spoken of as so many "knots." It is incorrect to say "knots per hour."

Most modern steamers use the patent or "taffrail" log. In this, a "fly" or rotator in the form of a propeller takes the place of the log-chip. As the fly is towed through the water it rotates, thus twisting the line and operating a system of gears which indicates the ship's speed on a register or dial on deck in somewhat the same way that a speedometer tells the speed of an automobile.

HOW THE SPEED OF SHIPS AT SEA IS MEASURED



Lying on the deck is the old style Ship's Log, consisting of a measured line attached to a wooden "drag" called a "log chip." The latter is weighted at the bottom so it will remain point up in the water and so offer enough resistance to drag the line steadily overboard. A sand-glass, usually one which will run out in 28 seconds, is used for timing. The log chip is rigged so that, when the log is run, a sudden jerk on the line will detach one side of the "harness" and permit the chip to be pulled back edgeways through the water. The "patent" or "taffrail" log is shown attached to the rail, its metal cable running out over the stern. At the end of that cable is a small propeller-shaped rotator like the one in the upper left-hand corner. The drag through the water sets this whirling, and this in turn whirls the cable, and so operates the gears inside the nautical "speedometer." The large hand on the face of the instrument indicates the speed of the ship.

The term "ship's log" or "log book" is also applied to the journals kept by ship commanders to record the course and speed of the vessel, and all other important details of voyages. Such records are required by law, and so important is the "log" as a legal record in case of deaths at sea, crimes, shipwrecks, collisions, suits over damaged or lost cargo, and marine insurance cases, that a ship captain will save his log book at any cost if his vessel goes down.

Written in dry and official language, these records often conceal in a brief sentence a whole stirring story of romance or tragedy of the high seas. "Seaman John Smith, overboard, rough seas, couldn't lower boats; Seaman Jones swims to rescue with life-line" —such an entry may conceal a piece of unrivaled heroism. The details of the sinking of the *Lusitania* by a German submarine—a deed which stirred the whole world and had a profound effect on the course of the World War—were recorded in a few brief sentences in the submarine's log. Yet upon that brief record rested the final conclusive proof of the guilt of Germany's sea-lords for that frightful tragedy.

LOGANBERRY. Next to the strawberry, the loganberry is probably our finest table berry, yet it is a comparatively recent product. It originated in 1881, at Santa Cruz, Calif., where Judge J. H. Logan found the fruit of a wild blackberry which was accidentally cross-fertilized from a cultivated red raspberry. Loganberries are now extensively cultivated from southern California to British Columbia. If protected in winter the plant can be grown in many parts of the Central, Middle, and New England states. The fruit is purplish red and very large. Its flavor is between that of its parents It is used as a dessert fruit, is extensively canned and dried, and the juice has become a popular beverage.

LOGWOOD. The "War of Jenkins' Ear," which broke out between England and Spain in the days of King George II (1739), was indirectly caused by this reddish-brown dyestuff. It was the story of Captain Robert Jenkins that his ear was cut off by Spanish coastguards, who accused him of poaching on Spain's logwood forests in Central America, that so inflamed the English that war followed.

Logwood grows to be a tree from 30 to 50 feet in height, and it gets its name from the fact that it is shipped in the form of logs. The tree, which is found in the West Indies, Mexico, and Central America, is

For any subject not found in its alphabetical place see information

ready for felling when about 10 years old. It is then stripped of the bark and sapwood, which are worthless, and cut into three- or four-foot lengths.

On exposure to the air the heartwood, which is very hard and heavier than water, takes on a beautiful brownish-red color. This is due to a crystalline substance called hematoxylin, which is extracted from the wood and is used in making dyes—purple, blue, gray, and black. It is used chiefly in dyeing cotton, silk, wool, and leather, and also in ink, in stains in microscopical preparations, and in medicine.

The finest kind and the greatest quantity of logwood comes from Campeachy in Mexico, for which reason it is often called Campeachy wood. Scientific name of the tree, *Haematoxylon campechianum.*

LOHENGRIN (*lō'ĕn-grĭn*). This "Knight of the Swan" is the hero of a beautiful medieval German legend. According to the story, when Elsa, a fair young duchess of Brabant, was in distress and waited despairingly for someone to come to her aid, there appeared a knight in a boat drawn by a silver swan. This was Lohengrin, the son of Parsifal (Perceval), whom King Arthur had sent from the castle of the Holy Grail to fight as her champion. Having won her cause, Lohengrin married Elsa, but he made her promise that she would never ask his name or whence he had come. They lived happily until Elsa, yielding to her doubts, asked the fatal question; whereupon Lohengrin was forced to bid her farewell. The swan-boat reappeared on the river and bore him away, never to return. Wagner has made this legend the subject of one of his beautiful operas.

LOIRE (*lwär*) **RIVER.** The longest river in France, the Loire is also the most interesting, for it rises in the southeastern part of the country, only 85 miles north of the Mediterranean, flows northward for over half its course through a strange and beautiful region, then sweeps with a great curve toward the southwest, where it passes through a famous country of old Roman ruins and historic medieval castles, discharging its waters at last into the northern part of the Bay of Biscay. Its whole course covers about 645 miles.

Rising in a spur of the Cevennes Mountains, 4,500 feet above sea-level, its headwaters are fed by melting snows from bristling mountain peaks, as it dashes through narrow gorges in a roaring torrent, carrying with it the débris of old volcanic eruptions. From this stormy region it emerges upon gentle green prairies where white oxen graze. Somewhat farther on, where the country is again mountainous, the river flows through a beautiful valley overgrown with vineyards and orchards, with here and there a strip of forest or a village with quaint old houses of stone or brick. At the northernmost point reached by the river, 75 miles southwest of Paris, is Orleans, an old city of many historic memories, delivered from the English in the 15th century by Joan of Arc. Below Orleans the Loire enters the old province of Touraine, a country of old Roman ruins and frowning feudal towers, whose halls once echoed to the mailed tread of French chivalry. About 75 miles southwest of Orleans rise the towers of Tours, the capital of the province; while 35 miles from the river's mouth is the city of Nantes, where Henry IV signed the famous edict giving religious liberty to the Protestant Huguenots (1598). At this point the Loire widens into an estuary with many islands, over portions of which Nantes, now an important manufacturing city, has spread. The port of St. Nazaire, accessible to the largest ocean-going vessels, lies at the point where the river mingles its waters with those of the Bay of Biscay; in the World War it was one of the chief ports of disembarkation for the American troops.

The Loire is navigable only in a very limited sense. In many places it is choked with rocks and gravel carried down from the mountains, or with sand and clay from the Paris Basin, rendering its channel uncertain. In the wet season its many tributaries so increase the volume that it floods wide stretches of land along its banks, while in the heat of summer it shrinks to a thread of sandbars and shallows. Many canals, however, have been built as an aid to navigation, notably those connecting it with the Seine, the Saone, and (at Nantes) with the harbor of Brest.

LOMBARDS. The most productive region of Italy, the great fertile valley of the Po, is still called by the name Lombardy, from the barbarian Lombard hordes who overran it in the 6th century. These people, the last of the Germanic invaders of Italy, pressed down from the north (568 A.D.) within 15 years of the time when the emperor Justinian had expelled the East Goths (*see* Goths). They soon gained the mastery of most of the peninsula, though Rome, Ravenna, and a few other fortified cities successfully resisted their assaults. They failed to establish a strong central government, however. Many small dukedoms grew up, thus dividing Italy into numerous small divisions whose jealousies and rivalries helped to lay the foundations for the disunion which lasted until the unification of Italy in 1870. The Lombard kingdom in the valley of the Po lasted a little more than two centuries; it was finally overthrown by Charlemagne (773), who invaded Italy at the request of the Pope, dethroned the king, and was himself crowned with the "iron crown" of Lombardy—so called because beneath the gold was a circlet of iron, said to be made from one of the nails with which Christ was crucified. After the break-up of Charlemagne's empire the Lombards gradually merged with the other peoples of Italy.

The energetic race which grew up from this fusion of Latin and Teuton became conspicuous from the 13th to the 16th centuries for the success of its members as merchants and money lenders. They found their way to London and other European cities in such numbers that north of the Alps all Italians came to be known as "Lombards," and finally the name "Lombard" became synonymous with "money lender." The street in London which corresponds to the "Wall Street" of the United States is still called from their name "Lombard Street."

GIANT LONDON —— The HEART of the BRITISH EMPIRE



St. Paul's Cathedral, from the Southwest

LONDON, ENGLAND. The first impression of a traveled American on reaching London may be one of disappointment. The Thames with its muddy current is not a large river, according to American standards, and much of the city itself is dingy and gray, moss-grown and old. Buildings famous in history and drama—Whitehall, The Temple, the Bank of England—seem small and plain compared to the giant skyscrapers of New York and other cities of the United States. There is so little visible that is sumptuous, regal—so little blare and glare and flare. London isn't a show-counter city. At first glance it is something like a slightly dowdy old lady—you could never mistake her for anything but a lady—who keeps her best gowns and laces in lavender and her best jewels in a family bank vault, only to be donned and exposed to view on rare occasions.

Then something begins stealing in upon you, like the beauty and majesty of the mountains, which speak in a language you cannot hear. Perhaps it is the sense of venerable uncounted years, like the lawns of the many parks which have taken a thousand years to grow their velvet swards; or the sense of vast multitudes of human beings—now, yesterday, the day before yesterday—back—back—back—before history, where history fades—of which this great city is the monument and the heir. Or perhaps it is the muffled roar of traffic like a stormy sea. The traffic of American cities doesn't roar; it screams and honks and rattles in staccato bursts of sound, and silence stabbed by new sounds. But London traffic is a roar, a muffled roar of countless wheels and feet and voices, all kinds and qualities of notes drowned in one symphony of beat-beat-beating sound like a storm at sea. It is like the muffled roar of a vast water-fall of human beings and races down all the ages of the world, over the precipice of today into tomorrow. You come shooting by rail up from Southampton to London, or westward from Liverpool with the parks and fields and villages blurring into one another on each side of you; or else you are towed up the estuary of the Thames, with green-gray banks and myriads of vessels of every flag under the sun to right and left of you. And the thunder of the city's traffic comes to meet you in a muffled beat.

Suddenly, instead of disappointment or disillusion, you catch your breath with a sense of awe. The longest human life is barely a comma on one page of this ancient city's history. Her thrift—"the thrifty husbandry" of many many years—the past, inheritance, custom, mean to the Englishman what new enterprise, the future, present chances, and breaking into new fields mean to the average citizen of the United States.

In New York, you would probably go first to the Woolworth Building or the Equitable, or the Singer Building, to get a bird's-eye view of the city at your feet. In London there are no skyscrapers, though you might climb to the tower of St. Paul's Cathedral to see the city eddying round below you; but remember that London is not only of the present but of the past. So you must choose some point that will swing your view backward as well as forward. Let us choose the square White Tower built by the Normans

soon after they came in 1066, a part of that great irregular structure, half fortress and half state prison, which stands at the southeast corner of the old mile-square walled city, and which we know as the Tower of London. Except for some scattered Roman remains, the Tower is the structure in London that will swing your thoughts farthest back. It is a pivot in history, and it is a pivot in geography, too; for it overlooks the Thames in a great sweep, with its miles and miles of inclosed docks; and it overlooks what is still called "the City"—the center of the banks and the money exchanges and the produce marts.

Any guidebook, or policeman, of whom there are 16,000 in London, will tell you how to go to "the Tower." You can go by the "tubes," which are the same as our subways; or you can go down the river in a little launch for a few pennies; or you can take any one of several lines of 'buses. First of all, you are impressed by the high massive thick stone walls. You will see only three such walls in all America—at Quebec, at Pensacola, in St. Augustine. These Tower walls were built in an age when men still fought with bow and arrow. They antedated gunpowder, and the biggest battering ram would be powerless against them. Bastion towers are placed at each corner of the wall, and there is a moat, with a drawbridge across it, which can still at need be flooded with water. Indeed, the Tower has all the parts of a medieval castle—moat and wall, outer and inner wards, "donjon" or keep, with the usual arrangement of battlements, towers, portcullises, winding stairs, and the like.

THE VALHALLA OF BRITAIN



Here in Westminster Abbey lie buried 13 kings of England and 5 sovereign queens, countless statesmen, soldiers, poets, scientists, and men who have won fame in every line of human endeavor. Here, too, every king or queen of England has been crowned since Christmas Day, 1066, when the royal crown was placed on the head of William the Conqueror.

Let us suppose we approach the Tower from the river. To your right as you land at Tower dock stairs is the wonderful Tower Bridge built like a Norman fortress; to your left London Bridge, across which flow great streams of traffic. At the Lion's Gate, on the western side, you obtain your admittance tickets, and proceed through the Middle Tower, cross the moat by means of a drawbridge, and enter the outer ward. Right at the entrance you get your first shock, that seems to carry you back exactly 400 years. The sentry or "warder" isn't in khaki, nor is he in the red and blue trousers that is the traditional uniform of the English

WHERE GREAT BRITAIN'S LAWS ARE MADE



Unlike most of London's famous structures, the Houses of Parliament are modern (completed in 1867), and they are so placed, with their east front directly on the Thames, that the full sweep of their length makes a vista of imposing beauty. Externally the chief features are the Victoria Tower, 340 feet high, at the left, and the St. Stephen's or Clock Tower, 318 feet high. The dials on the clock are 23 feet in diameter, and Big Ben, the famous bell in the tower, weighs 13 tons. The building is in the perpendicular style and covers an area of eight acres, containing 1,100 apartments.

Tommy. He is a resplendent being with close-cropped beard, scarlet doublet, and knee breeches, for all the world like an old colored print of Henry VIII, who married so many wives! The warders are called "Beef-eaters," perhaps because of their ruddy well-fed appearance. They are all old soldiers with honorable records.

A "LIFE GUARD"



The Life Guards are the household troops or bodyguard of the sovereign. Their dress uniform is most colorful and picturesque: scarlet tunics are set off by plumed steel helmets, white buckskin breeches, and long black knee boots.

In the center of the side of the Tower which faces the river is Traitors' Gate, through which state prisoners brought by way of the river were once conveyed into the Tower. Passing down the outer ward until you are opposite this frowning entrance, you turn to your left and enter Wakefield Tower. Here are the crown jewels of Great Britain—the crown made for Charles II in 1661, and which Colonel Blood and his accomplices tried to steal ten years later; crowns of later sovereigns, of the Prince of Wales, and of the queen consort; a great uncut ruby once given to the Black Prince, and later worn by Henry V at Agincourt; scepters of state, royal spurs of gold, a silver-gilt baptismal font for the royal children; a model of the great Kohinoor diamond (the original is in Windsor Palace); and a host of other priceless trinkets. A single crown—that worn by Victoria at her coronation and altered in 1902 for Edward VII—contains 2,818 diamonds, 300 pearls, and other gems. Such magnificence fairly takes one's breath away.

Passing into the inner ward under the Bloody Tower, we find at last the object of our quest—the White Tower, the original donjon or "keep" of the fortress. In its historic hall occurred the abdication of Richard II in favor of Henry of Lancaster (1399); and under its winding stairs, inclosed in the massive wall, were found in recent years the bones of the two young princes—King Edward V and his brother—murdered by order of their uncle Richard III. On the upper floors is a wonderful collection of old arms and armor, giving a faithful picture in orderly succession of English war array from the days of Edward I (1272) to those of James II (1688). The series includes a number of mounted knights in full armor, as well as many armored figures on foot.

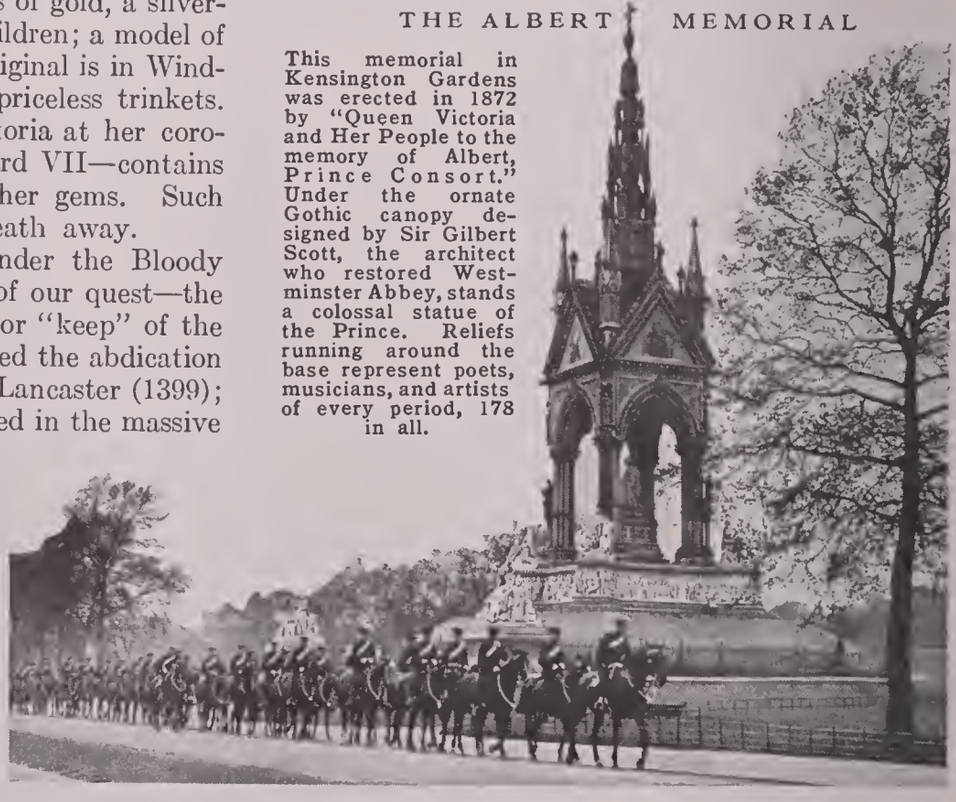
What a panorama of history this collection presents, and what thoughts come to one, dreaming of bygone days in the heart of the Tower! Of late years the Tower has been used only for museum purposes. But everywhere you find abundant traces of its former use as a fortress and state prison. Up and down its stone stairs once clanked the armored tread of medieval barons. From the days of the Normans to the days of the Tudors the Tower kept its character of castle and was frequently the royal residence. Charles II was the last sovereign to sleep within its walls, on the night before his coronation (1661). Numerous are the famous persons who at one time or another were confined in the Tower. Wallace and Bruce, the Scottish patriots, were among the number; and also Sir Thomas More, poor Anne Boleyn, and Queen Catherine Howard, who were all beheaded here in the days of Henry VIII. Gentle Lady Jane Grey was another victim; and the future Queen Elizabeth passed anxious weeks in her princess days, a prisoner in the Tower, while her fate trembled in the balance. Here, too, Sir Walter Raleigh whiled away tedious years writing a 'History of the World' while awaiting his tragic end. In this stern old fortress, also, were imprisoned and shot a number of German spies in the World War of 1914–18. With every breath you take within its walls, you breathe in English history.

The Vast City and Its Puzzling Streets

But let us hurry to the upper chambers and look out through one of the deep casement windows. London lies below us, busy as a disturbed ant-hill—London, the "city of Lud," an ancient king of the Britons who ruled his clans in their flimsy huts on the marshy

THE ALBERT MEMORIAL

This memorial in Kensington Gardens was erected in 1872 by "Queen Victoria and Her People to the memory of Albert, Prince Consort." Under the ornate Gothic canopy designed by Sir Gilbert Scott, the architect who restored Westminster Abbey, stands a colossal statue of the Prince. Reliefs running around the base represent poets, musicians, and artists of every period, 178 in all.



THE THROBBING CENTER OF THE EMPIRE



This view was taken from the heart of "the City"—that ancient mile-square district in which the financial and commercial life of the British Empire centers. The skyline here is not broken by towering skyscrapers, as in the great cities of the United States but by the massive dome of St. Paul's, and the slender spires of dozens of smaller churches. Most of these, like St. Paul's itself, were built by Sir Christopher Wren, after the Great Fire of 1666. Beginning at Blackfriar's Bridge, to the left of St. Paul's, the Thames Embankment sweeps around the wide bend of the river, past the Waterloo and Westminster bridges, southward to the Houses of Parliament and Westminster Abbey.

shores of this "pool" of the Thames, in the days before the Romans conquered the land. Here was the first firm ground on which vessels from the sea could land their goods, and here was the lowest point at which the river could be forded or bridged, so roads converged at this point and London grew to the mighty giant of today. Romans built the first bridge, where we see the Tower Bridge turrets. King Alfred the Saxon added to the city's fortifications; and William the Conqueror built the Tower, as we have seen.

Let us get the "lie" of the city as we look out from the Tower! The Thames sprawls like a great, broad muddy S to the west and south and winds its sluggish course 40 miles eastward to the sea. When the Tower was built London had about 30,000 people. When New York was a village in the 1700's, London housed 900,000 people. Today Greater London covers 693 square miles and has a population of about 7,258,000. If the streets were laid out end to end, they would make a paved driveway from New York to San Francisco. Of churches, it has 1,500. In London are more Scotchmen than in Aberdeen, more Irish than in Dublin, more Jews than in Palestine.

What puzzles you at first is the way the streets twist and turn. But as you look from your casement window in the Tower, you see that these higgledy-piggledy streets that seem to criss-cross every way—so different from American cities laid out in oblongs and squares—really run parallel with the "S" of the river. We are right in the heart of business London, with the Mint and the Bank of England, the Stock Exchange and Custom House, and innumerable counting-houses, brokers, and insurance offices. Away to the east are the "Pool" of the Thames and the docks of the great Atlantic liners and the East India vessels, and the freighters for three-quarters of the world's commerce; and there too are the slums and terrible poverty of Whitechapel, the heart of all that is most wretched amid the splendors of historic London.

The Old Lady of Threadneedle Street and Her Neighbors

But in the neighborhood of the Tower you could hardly shoot an arrow without its dropping into a street famous in finance and history. Lombard Street, Threadneedle Street, Cornhill, and Leadenhall Street are narrow little streets famous for banking and finance, the first being named after the Italian merchants and bankers who settled there in the 14th and 15th centuries.

The Bank of England—"the Old Lady of Threadneedle Street," it is humorously called—lies just a little northeast of the Tower. It has not a single window in its external walls, being lighted altogether from interior courts. It covers the most important four acres in the British Empire, and is a center of world finance. Up to the time of the World War it was the sole British bank with the power to issue

paper money. There are several thousand clerks under its roof, and seldom less than $100,000,000 in gold and silver, and $125,000,000 in notes.

Everywhere hereabouts are historic memorials. Alexander Pope, the poet, was born in a little side street just off Lombard Street. Samuel Pepys, the famous diaryist, who spent his days in the Admiralty offices, lived not far from Tower Street. Radisson, who reached the Mississippi River 18 years before Marquette and Joliet, had a house near Pepys, only a few minutes' walk from the Tower; and that is how Pepys got all Radisson's papers of discovery. The Hudson's Bay Company, which dominated half of North America for two centuries, had offices (and have yet) in Lime Street, just a few steps from the Bank of England. Hogarth the engraver had quarters here in his heyday; and Addison the essayist was married in a little church off Lombard Street. To the west of the Bank of England is the Mansion House, the official residence of the lord-mayor of the "city" of London (the metropolis as a whole has no mayor). Only a stone's throw behind the Mansion House is St. Paul's, the cathedral of the Bishop of London.

TRAFALGAR SQUARE AND THE NELSON MONUMENT



The marble column to the memory of Lord Nelson, whose statue surmounts it, was completed in 1843, but the four lions, modeled by Sir Edwin Landseer, were later added at the corners. On the far side of the Square is St. Martin's-in-the-Fields, whose fine Corinthian portico is one of the choicest examples of the classic style in architecture, which was in vogue in the 18th century.

Books have been written about St. Paul's. It is as famous as is Westminster Abbey, which we shall visit presently in the West End. Legend says it is built on the site of a temple to Diana, replaced by the Romans with a Christian church, which in turn was torn down by the pagan Saxons. Old St. Paul's, famous in Reformation days, was built about 1160. The present building was planned by the great architect Sir Christopher Wren, and is one of more than 50 churches constructed by him after the Great Fire in 1666 had destroyed about four-fifths of the London of that day. The present St. Paul's is in the form of a Latin cross, measuring 500 feet in length the long way and 250 feet through the short arm. It is crowned by a magnificent dome, the extreme tip of which is 364 feet from the pavement. The diameter of the dome is 102 feet, or 37 feet less than St. Peter's in Rome. The greater part of the money for rebuilding St. Paul's was raised by a tax on coal.

Just as Westminster Abbey—which we shall describe when we come to the West End of London—has become the Valhalla of the great British dead for many centuries past, so St. Paul's has become a sort of second Hall of Fame for the dead of the past hundred years. Historians like Henry Hallam, artists like Lord Leighton and J. M. W. Turner, soldiers like Gordon of Khartum and the "Iron Duke" of Wellington, are here commemorated in bronze and marble. Their tombs are in the crypt below, which runs the whole length of the church. In that resting place are the tombs of Sir Christopher Wren himself, and of Deans Liddon and Milman who won fame by their writings as well as through their offices as custodians of this great church. Under the center of the dome, in the crypt, stands the black marble tomb of Admiral Horatio Nelson, Britain's greatest naval hero.

And what a host of associations cling round the little by-streets close to St. Paul's! St. Paul's Coffee House and the Queen's Arms and Cheshire Cheese taverns, only a few steps from St. Paul's, were frequented by Dr. Johnson and Oliver Goldsmith, and

FLEET STREET, LONDON'S "NEWSPAPER ROW"



Fleet Street is the winding way leading to the majestic west front of St. Paul's, whose dome is dimly visible in the distance. The street is noted for its many newspaper offices and printing establishments. "The Fleet" was once a small stream emptying into the Thames, but it has long since been covered and now flows under the street through a conduit.

by the Americans Washington Irving and Benjamin Franklin. Little folks may like to remember that the first books issued for children were printed by John Newberry, a publisher here, and Goldsmith is supposed to have helped to write 'Goody Two Shoes' and 'Mother Goose'. Old smelly bookstalls still flank St. Paul's, where you can pick up treasures—perhaps a volume of Dr. Johnson's essays, bound in musty calf, or an early edition of Keats' 'Endymion', or a shabby, well-thumbed Scott's 'Ivanhoe'.

Let us take a final look from our window in the Tower, before betaking ourselves to the West End, where we shall find the center of government, wealth, and fashion, as the East End is of finance, shipping, and poverty. As an approach to this gilded region let your eye follow westward up the straggling Thames, and you will see one of the most wonderful drives in the world—the Thames Embankment.



One of the "Bobbies" who make London the best-policed city in the world.

The Embankment runs along the north bank of the Thames from the Parliament buildings in Westminster more than a mile upstream to Blackfriars Bridge, a mile or so west of where you stand. The carriage way is 64 feet wide and a footpath 20 feet wide runs along the river side. Rows of trees line footpath and drive, and seats are placed at intervals beneath the trees. By daylight there are few more animated scenes in London, for along the Embankment way motors and carriages stream to the "city" in the morning and back in the afternoon, while shuttling up and down the Thames are boats and river craft of every description under the sun—wherries, electric launches, private yachts, latteen sails, three-masters, ferries, small passenger boats, sculls, row-boats, canoes, market punts, even vegetable rafts. By night, the land traffic ebbs to a few motor cars and taxis, and perhaps an occasional horse-drawn cab.

Between the Embankment on the one side and the Strand and its continuation, Fleet Street, which are part of the first of the important east-to-west thoroughfares of London, are some of the most famous landmarks of the British Empire. The Temple is the first of these we will notice. Really it is not a "temple" at all, but gained its name long ago, because here was the London stronghold of the crusading order of Knights Templar. For centuries the buildings here have been inhabited by young men studying to be "barristers," or lawyers, and its name has become famous in history and literature. Goldsmith and Charles Lamb and Thackeray all occupied apartments in the Temple. There are interesting "gardens," a wonderful old church, and a hall where Shakespeare's first plays were acted and Queen Elizabeth used to dine.

A half-mile to the west lies Whitehall. Its grandeur dates back to the great Wolsey, the discarded favorite of Henry VIII, for here was Wolsey's London residence as archbishop of York. After his fall it became crown property and was renamed Whitehall. It became a palace of regal splendor under the Tudors

and the Stuarts; but only the great Banqueting Hall remains; and its memories are chiefly of tragic history. It was here that Henry VIII met Anne Boleyn, and here the selfish old voluptuary died. It was through an opening made in the walls that Charles I was led out to execution on a scaffold erected in the street. Cromwell lived here; Milton wrote state papers here; Charles II held here the wild orgies of his court and died with the name of poor Nell Gwynn on his failing lips. In the center of Whitehall stands the majestic cenotaph erected to the memory of those who died in the World War. In Whitehall Street are also the chief government offices of the Empire—the War Office and the Admiralty, the Treasury and the India Office and Colonial Office, and all the rest. The official residence of the Prime Minister, the head of this vast governmental machine, is in a little by-way called Downing Street. And near by down towards the Thames is that place of mystery and exciting romance—Scotland Yard, the headquarters of the Metropolitan Police.

The Political Heart of the Empire

On the Thames side are the Houses of Parliament by Westminster Bridge, and at right angles to them is Westminster Abbey. Here is the heart of the British Empire; here beats the political pulse for a quarter of the people in the known world. It would take a book to describe either the Parliament Buildings, or Westminster Abbey; and even then each visitor would carry away a different memory. The Old Parliament Building was burned in 1834 when an impatient janitor overheated a flue in burning up wooden "tallies" or receipts which had accumulated in the Treasury in the course of six centuries. This gave opportunity to erect the present beautiful Gothic building, covering an area of eight acres. In their respective chambers sit the House of Commons and the House of Lords, amid surroundings of the highest historic significance.

Westminster Hall, which was begun by the conqueror's son, William Rufus, and remodeled by many of his successors, still stands and serves as a vestibule to the Houses of Parliament. Here were held some of the earliest Parliaments. In this hall occurred the coronation feasts until early in the 19th century. Here Edward III entertained the captive kings, David of Scotland and John of France; and here Edward II and Richard II were declared deposed. In this historic hall Charles I was tried and condemned to death by a high court set up by Parliament; and from this hall Cromwell a few years later turned out the "Rump" of that Parliament, locking the door and putting the key in his pocket!

But perhaps the visitor will remember best of all "Big Ben," the great bell in the Clock Tower at the north end of the Parliament Building, next to Westminster Bridge. The clock takes five hours to wind, and the bell, named in honor of the official in charge of its erection, weighs 13 tons. On account of a crack or flaw the tone at first became shrill, but since the crack was filed open the tone has been quite pure. In calm weather the voice of Big Ben can be heard over the greater part of mighty London. The throne chair, the seats of the Lords and the Commons, the numerous portraits and statues of great men—what are these to Big Ben booming forth the hours at the heart of the Empire! Lords and Commons seem only bubbles in the froth of time. "Hurry up! Hurry up, England! and follow 'round the world after the sun, which never sets upon your flag!" So Big Ben seems always to be saying above the city's roar.

Just across the street from the Houses of Parliament stands Westminster Abbey, founded by Edward the Confessor and added to by his successors until it became the superb Gothic church that it is today. What could be more amazing than the "fan vaulting" of the chapel of Henry VII, composed of giant masses of intricately carved stone, hanging like airy cobwebs from the interlacing ribs of the ceiling?

In Westminster Abbey, you are in an altogether different atmosphere from any other place in the world. Here is enshrined England's past, the history of her national soul; here are royal burial vaults and innumerable tombs and monuments of illustrious men. It is not so large as St. Paul's cathedral, and it has never been a bishop's seat. But it is draped with awe and veneration, from the Poet's Corner, where the names read like a catalogue of English literature, to the Saint's Crypt and the Little Chapel, where the monarchs of England are done in wax, all togged out in their faded tinsel and finery! One of the most pathetic of tombs is that of the Unknown Soldier of the World War, in which are honored also the many thousands of other nameless British heroes of that great conflict. You could spend hours studying the architecture, or reading over the epitaphs, or conning a history that goes back to the Danes. But in the end you will sink exhausted in one of the rear pews to let the floods of the choir roll over your soul and the subdued light of the great "rose window" lift your thoughts to things far away and sublime.

The Work of Greatness

Then any sense of disappointment you may have felt is gone forever. England points back to before history, and forward to after history; and it is not because of the greatness of her island and colonial possessions. It is because of the greatness of her sons' and daughters' souls. It is they who have made her great, not material things—great on sea, on land, great in drama and art, great in learning and integrity, great in dauntlessness and freedom.

We shall not have time to go to St. James's Park, not far from Westminster Abbey, and visit Buckingham Palace and St. James's Palace—even if we could gain admission. The first impression of these royal palaces would probably be one of disappointment. St. James's Palace has not been used as a royal residence since 1861, when the Prince Consort, Queen Victoria's husband, died. Buckingham Palace is hardly as imposing as many of the great hotels and private

residences of New York or Chicago. It is neither the luxury nor the beauty of British palaces that makes them dear to the British heart, but what they stand for—a sort of keystone to the arch of self-government. Compared to the beautiful chaste White House in Washington, there is not a palace in all London that does not look dingy and dark and grim.

Westward of St. James's Park is the famous Hyde Park, a vast expanse of 390 acres (with Kensington Gardens, which it adjoins, 630 acres), which was once a royal park but is now a people's pleasure ground. On Sundays and holidays it is thronged with people. Many of them gather in good-natured knots about impromptu orators, who are here free to speak freely on almost any subject they desire—religious, political, economic, or what not. It is one of the safety-valves of the British constitution. Regent's Park lies a mile to the north, with its zoölogical garden showing the animals in their natural surroundings—the greatest zoo in all the world!

Let us now take a 'bus and ride down Piccadilly from Hyde Park Corner, viewing residences and clubs from the 'bus top—a favorite method of sight-seeing. You may be surprised to discover that Piccadilly Circus, from which radiate Regent Street, Shaftesbury Avenue, Coventry Street, and others, is not a "circus" at all in our sense, but only one of a number of circular spaces, like the circles which are so numerous in Washington City. Here we are in the heart of the great theatrical district of London, while to the north is the curious old Italian quarter called Soho, famous for its many table d'hote restaurants.

THE MOST POPULAR "CIRCUS" IN LONDON



This is Piccadilly Circus, one of the busiest points in London. In England the word "circus" is applied to a round open space, at the junction of several streets. Piccadilly Circus is the heart of London's theatrical district, and everywhere around are high-class retail shops.

Our 'bus turns down Haymarket—a name reminiscent of other and more rural days—and presently we are at Trafalgar Square, with its tall column crowned by the figure of Nelson. This is the time-honored center for British demonstrations of the people, whether it be against unemployment, in favor of "votes for women," or what not.

AN AMERICAN AMONG ENGLAND'S HEROES



In Trafalgar Square, a stone's throw from the Nelson Memorial and monuments to other great Britons, is this bronze statue of George Washington. The statue is a copy of the well-known figure by Houdon, and was in 1921 "presented to the people of Great Britain and Ireland by the Commonwealth of Virginia" to symbolize the indissoluble spiritual union of the two great English-speaking nations.

Near Trafalgar Square is the National Gallery. About a mile below it, on the Thames, is the Tate Gallery, one of the most truly national things in the British Empire, for it houses special collections of British art, all provided by generous donors. But a whole day would be needed for even a casual inspection of the art works which they contain. When you go there perhaps you will be struck by the many interpretations of the sea in its myriad moods—boys listening to old Spanish mariners spinning yarns of the Spanish Main, Turner's wonderful pictures of the secret of Carthage's greatness, two little children playing in the sand, and the like,—for it was the sea that led Englishmen around the world.

Just as the National Gallery and the Tate Gallery are the most national things in England, so—with the exception of its great collection of books and old manuscripts, of ancient folios and Bibles, which is the finest in the world—the British Museum is one of the most *un*national things in all England. Its massive halls—about a mile north of the National Gallery, beyond Oxford Street—are essentially British, but its collections on archaeology are far better for Rome and Greece and Egypt than for the British Empire. Here you may see the famous Elgin marbles—the original sculptured slabs that once adorned the Parthenon in Athens, and which were removed to England in 1801–03, while the barbarous Turk still ruled Greece. Here are the remains of the vast mausoleum at Halicarnassus, and of the Temple of Diana at Ephesus, both excavated by British scholars. In the Babylonian and Assyrian section you find remains dug up at Nineveh and elsewhere—giant human-headed bulls and lions, life-sized slabs showing wars and lion hunts, cuneiform inscriptions, until one's head reels with the thought of the far-off history to which they refer. And then the Egyptian rooms, with the Rosetta Stone whose parallel inscriptions enabled scholars to unlock the secrets of hieroglyphic inscriptions; and mummies and mummy cases, and statues, glass objects, painting, and papyrus without end. After these relics, which have served to unlock whole eras of forgotten history, the collections of Etruscan antiquities, of Greek vases and terra cottas, of later Asiatic remains, and the like, seem paltry and almost commonplace.

THE HISTORIC TOWER OF LONDON



No spot in London calls up more memories of historic names and events than the Tower. This moated Norman fortress still stands guard over the eastern boundary of "the City," but it is used chiefly as a museum.

When you emerge from the Museum you feel the need of fresh air and perhaps go for a 'bus ride to Chelsea, where George Eliot and Carlyle lived and worked, and saddened in their toil. You have only touched here and there the central parts of metropolitan London. To the north lie enormous areas, such as Hampstead Heath and Camden Town. To the east are Greenwich and Woolwich—the one the seat of the national observatory on the central meridian of longitude, the other of the great British military academy. To the south of the historic river are Battersea and Lambeth, and to the west Chelsea, Walham Green, and distant Richmond, with its lovely expanse of park.

Though you should tarry a year in London, and give every day to sight-seeing, you could not begin to exhaust the interest and the wonder of this giant city.

London became a place of importance under the Romans, probably first in 43 A.D. It was burned by the Britons under Queen Boadicea in 61 A.D. From 369 till 412 it was the capital of Roman Britain. Bede calls it a "princely town of trade," when it was the capital of the East Saxon kingdom. King Alfred restored the city after it had been burned and the Roman walls destroyed by the Danes. London, already rich and prosperous, sided with the House of York in the Wars of the Roses. The principles of the Reformation were welcomed and the suppression of monasteries and the confiscation of their property under Henry VIII made him popular, though the same treatment of the gilds lost the Duke of Somerset the favor of the citizens. Under Queen Elizabeth new openings for adventure in America and India gave a great impulse to the city's trade. London was a powerful aid to Parliament in its war with Charles I and the city's "trained bands," made up of Puritan apprentices, fought on many a bloody field. The plague, which had several times visited London, in 1665 destroyed one-fifth of the population; and the Great Fire of 1666 burnt 396 acres of houses.

Immediately after the fire, Christopher Wren, the noted architect, presented to the king a plan for rebuilding the city on a new and systematic design, but the jealousy of the property-owners made its adoption impossible. Wren did, however, supervise the work of rebuilding, and he left his distinguishing mark on the cathedral of St. Paul's and the many churches around it.

London was first lighted by lanterns in 1415, by gas in 1807. The streets were first paved in 1533. Omnibuses began to run on regular routes in 1829; the Metropolitan underground was open in 1863; and the first underground "tubes," now so important for quick travel, in 1890.

The resident population of the mile-square "City" (within the Roman walls, now the business section) is only about 20,000. In addition London comprises 28 metropolitan "boroughs," each administering its own affairs. The London County Council (since 1889) takes care of most matters concerning the city as a whole.

What is known as Greater London includes the Metropolitan Police District and the City of London Police District, and covers an area of 693 square miles, with a population of 7,251,358. The London County Council consists of 118 members and 19 aldermen. The "City" is governed by a Lord Mayor, 25 aldermen, and 206 common councilmen. London City returns two members to Parliament; London University, 1; and the London boroughs, 60.

London, Ontario. Like the famous city of England from which it takes its name, London, the commercial center of western Ontario, is situated on a river Thames. The site was chosen and the name of the town and river given by Governor Simcoe. It is in the heart of one of the richest agricultural sections of Canada, a triangular peninsula hemmed in on two sides by lakes Huron and Erie, and its prosperity comes chiefly from its position as the marketing and distributing center for this thickly settled region. It is 23 miles north of Port Stanley, a harbor on Lake Erie, with which it is connected by a municipally owned and operated railway. Electric power from Niagara Falls, about 100 miles west, adds to the city's advantages as a manufacturing center. Iron and steel mills, furniture factories, car works, stove manufactories, and rolling mills are among the many industrial establishments. Western University, founded under the patronage of the Church of England, is located here. Population, about 60,000.

Longfellow, Henry Wadsworth (1807–1882). Have you a favorite poet? If it is Longfellow, then Hiawatha is a friend of yours, and King Olaf, that fine strapping hero; and you know all about the village blacksmith, and 'Evangeline' with its "forest primeval" makes you feel both sad and pleasant. If Longfellow is your favorite poet you will have made a wise choice, for he is perhaps the ideal poet for young people. Afterwards, when you grow older, you may prefer someone else, Keats or Whitman or Herrick. But Longfellow understood perhaps better than any one else how to write for children.

Longfellow was himself not unlike a child, big and simple-hearted and friendly. He taught young people for many years as professor of modern languages at Bowdoin and at Harvard colleges, he had children of his own, he helped and encouraged many young poets. Everybody loved him, from the great men of his day, like Emerson, Hawthorne, and Holmes, to the children he played with every afternoon at the "children's hour."

Bringing Europe to America

He did an important service in opening the eyes of his countrymen to the beauties of European legends and literature. He knew French and Italian and German, and his verse translations—especially of Dante's 'Divine Comedy'—brought many foreign poems within the reach of the American people. His own poetry too was often founded on some European folk story or legend, as for instance most of the 'Tales of a Wayside Inn' and 'The Sagas of King Olaf'. Others, like 'Paul Revere's Ride' and 'The Courtship of Miles Standish', were founded on events in American history; Longfellow himself was a descendant on his mother's side of John Alden and Priscilla.

In his famous 'Hiawatha', Longfellow used material found in old Indian legends. The Iroquois Indians had stories of a great and wise chief named Hiawatha, who lived shortly before the appearance of the white man in America, and who played an important part in bringing together the tribes of the powerful Iroquois League. There were also numerous legends among the Algonquian Indians of the Great Lakes about another hero known by various names. Longfellow became interested in these legends, as told by Henry Rowe Schoolcraft, an American ethnologist, and decided to write a narrative poem founded upon them. The hero, according to Longfellow, was "a personage of miraculous birth, who was sent among them (the Indians) to clear their rivers, forests, and fishing grounds, and to teach them the arts of peace. He was known among the various tribes by the several names of Michabou, Chiabo, Manabozo, Tarenyawgon, and Hiawatha." Longfellow thus united the various legends, and gave his hero the name Hiawatha, as this seemed to him the most musical. The exploits, however, are those of the Algonquian hero. The verse form and style of the poem were adopted from the 'Kalevala', the Finnish epic.

Nobody could write a tale in verse better than Longfellow. He also wrote shorter poems that are very famous—'A Psalm of Life', 'Excelsior', 'The Children's Hour', and others that will always be loved by Americans. His poems also won recognition abroad and were translated into European languages. He is one of the most popular poets in literature.

His Life is Uneventful

Longfellow's personal life was rather uneventful. He was born at Portland, Me. (which was then a part of Massachusetts), and passed a happy childhood in this beautiful town with its elm-shaded streets and wide view over the bay. When he was 18 he was graduated from Bowdoin College, in the same class with Hawthorne; and after three years' travel and study in Europe returned to his alma mater as professor of modern languages. He remained here until 1835, when he resigned to accept a similar appointment at Harvard. In the same year came his first great sorrow, the death of his young wife while he was traveling with her in Holland. In 1843 he married again, the second wife being the heroine of his prose romance 'Hyperion'. Eighteen years of idyllic happiness followed and these were also the greatest creative years of his life. A tragic break came when his wife was burned to death. It was long before he recovered from the shock, but his last years were made happier by the devotion of his five children and by the growing love and veneration of his countrymen for the kind-faced, white-haired poet. Craigie House, his beautiful colonial residence in Cambridge, Mass., still stands and is visited by many pilgrims.

Longfellow's poems were published often in magazines first and then collected into volumes, having as a volume title the title of one of the poems. In the final edition in the Riverside Edition these poems and a few earlier prose works make 11 volumes. His chief separate volumes were: 'Poets and Poetry of Europe' (translations, 1843); 'Evangeline' (1847); 'The Song of Hiawatha' (1855); 'The Courtship of Miles Standish' (1858); 'Tales of a Wayside Inn' (1863–73); translation of Dante's 'Divine Comedy' (1871); editor, 'Poems of Places', 31 vols. (1876-79).

THE "CHILDREN'S POET" AND "EDITH WITH GOLDEN HAIR"



No doubt one reason why Longfellow makes such an appeal to young people and has done so much for them through his poetry is because he loved them so. His family life was the dearest thing in all the world to him. One of his best-loved poems, 'The Children's Hour', draws a delightful picture of his daughters—"Grave Alice, and laughing Allegra, and Edith with golden hair." This picture shows Edith reading to her father something she has found particularly interesting.

For any subject not found in its alphabetical place see information

The Story of Hiawatha



It was in a wigwam like this that Hiawatha lived with his Grandmother, Nokomis, down by the shore of Gitche Gumee, "the shining Big-Sea-Water." Imagine the dark-skinned baby boy being hushed to sleep in his moss-lined cradle at the end of a nice long story about the moon that is making the golden pathway across the great inland sea.

MANY years ago, by the shores of Lake Superior, which the Indians called Gitche Gumee, "the shining Big-Sea-Water," there stood the wigwam of old Nokomis, Daughter of the Moon.

Here Nokomis lived with her grandson Hiawatha, whose beautiful mother had died when he was a baby and whose father, Mudjekeewis, the West Wind, had gone off and forgotten all about him. Nokomis hushed the little one to sleep in his moss-lined cradle, and told him many a fanciful tale about the moon, the fiery comet, or the rainbow that he saw above the dusky pine trees that cast their velvet shadows about the wigwam.

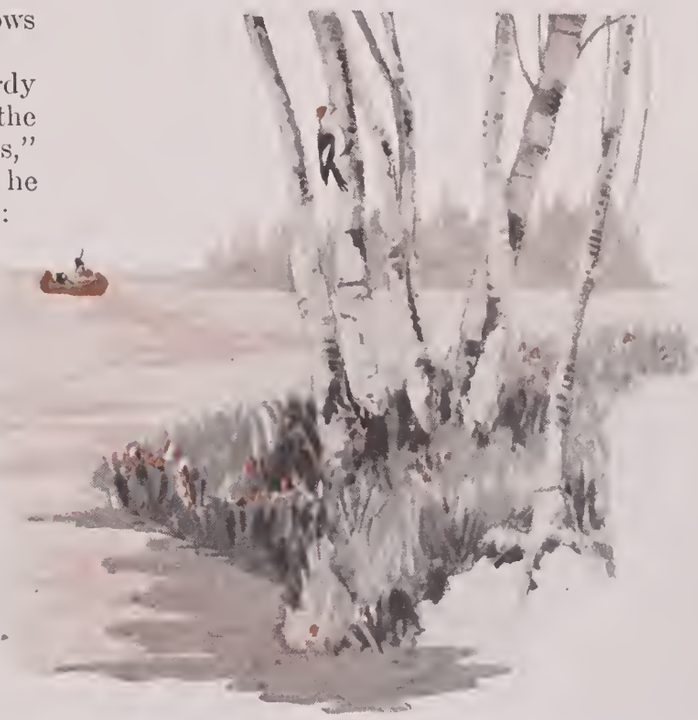
Almost as soon as he learned to speak, the sturdy little Indian boy learned also the language of all the birds, "learned their names and all their secrets," and called them "Hiawatha's chickens." So, too, he learned all about the beasts of the field and forest:

How the beavers built their lodges,
How the squirrels hid their acorns,
How the reindeer ran so swiftly,
Why the rabbit was so timid,
Talked with them whene'er he met them,
Called them "Hiawatha's brothers."

So Hiawatha grew into a strong, brave, and noble man. He was a mighty hunter and had many strange adventures. He wore magic mittens of deerskin with which he could smite great rocks asunder, and enchanted moccasins which took him a mile at every stride.

One of Hiawatha's great battles was with the fierce Pearl-Feather, a wicked magician who lived in a wigwam among stagnant pools guarded by coiling serpents. Because of a magic shirt he wore, Pearl-Feather could not be harmed. At last Hiawatha, wounded, exhausted, and in despair, had only three arrows left. "Aim your arrows at the roots of his hair, Hiawatha," sang a woodpecker to him. Hiawatha did so, and the mighty magician lay dead at his feet. Then, before he took back the furs, wampum, and other enemy trophies to divide among his people, Hiawatha stained the little woodpecker's head with blood, in honor of his service. That crimson badge the woodpecker proudly wears to this day.

In order that he might bring blessing to his people, Hiawatha once went alone into the forest to fast and pray. On the fourth day of his fasting, as he lay on his couch exhausted, a youth dressed in green and yellow garments, with plumes of green falling over his golden hair, came to Hiawatha and bade him wrestle with him. Hiawatha arose, and feeling new life and vigor within him, wrestled with the stranger until he cried, "'Tis enough." On the morrow, and then again on the next day the youth Mondamin



"Then, before he took back the furs, wampum, and other enemy trophies to divide among his people, Hiawatha stained the little woodpecker's head with blood in honor of his service. That crimson badge the woodpecker proudly wears to this day."

came and wrestled with Hiawatha. As he departed after the third conflict, he said that he would come once again and that this time Hiawatha should conquer him.

At last on the fourth day, after a long struggle, Mondamin lay lifeless on the ground, with his hair disheveled, his plumage torn, and his garments tattered. Hiawatha buried him carefully in the soft earth, as Mondamin had bidden him, where the rain might fall upon him and the sun might warm him. Day by day he watched beside the grave and tended it carefully, "till at length a small green feather" shot upward, and then another and another.



"Hiawatha fell in love with Minnehaha. To woo her he brought her a fine red deer and laying it before her feet told her of his love."

> And before the Summer ended
> Stood the Maize in all its beauty,
> With its shining robes about it
> And its long, soft, golden tresses.

Thus it was that Hiawatha gave to his people the great gift of maize, or Indian corn.

The Indians saw in Hiawatha the prophet and great teacher that Gitche Manito had promised to send them. Hiawatha taught them picture writing, the art of healing, and many other things; and he kept the tribes at peace. He performed many other brave and cunning deeds—such as when he was swallowed by the great sturgeon Nahma and killed the fish while inside his stomach; and when he chased the wicked Pau-Puk-Keewis, a gambling mischief-maker, chased him though he turned into the form of a beaver, a brant, and a serpent, and finally called down the lightning to kill the mischief-maker while he was hiding in a mountain cave.

Hiawatha fell in love with Minnehaha, or Laughing Water, the beautiful daughter of an old arrow-maker in the land of the Dacotahs. To woo her he brought her a fine red deer, and laying it before her feet told her of his love. Then the Dacotah maiden—

> Softly took the seat beside him
> While she said, and blushed to say it,
> "I will follow you, my husband."

Hiawatha took his bride back to the land of the peaceful Ojibways, where a great wedding feast awaited them. Pemican, bison, buffalo marrow, wild rice, and other delicacies were spread before the many guests; and there were strange stories, weird love songs, and mystic dances for their entertainment.

Hiawatha and his bride were very happy together, but at last there came a cold dreary winter, when the Indians could hunt no food in the snow-buried forests and an epidemic of fever spread among the starving tribes. Then one day Hiawatha strode forth in anguish, praying that he might find food for his beautiful Minnehaha, who lay in the wigwam stricken with the deadly fever.

While he was gone Minnehaha lifted up her head. "Hark!" she cried, "I hear the Falls of Minnehaha calling to me!"

"No, my child," said old Nokomis, soothingly; "it is but the night wind in the pines."

"Look!" exclaimed the girl, "I see my lonely father beckoning me."

"'Tis but the smoke you see," answered Nokomis.

"Ah," cried Minnehaha, "I see strange glaring eyes —and icy fingers . . . Hiawatha! Hiawatha!"

Far away in the forest Hiawatha heard the cry, and hurrying back burst into the wigwam. But Death had already claimed his beautiful Laughing Water.

Spring climbed over the hills with birds and blossoms to bring comfort to Minnehaha's husband. And with summer there came a morning when from his wigwam door Hiawatha stood looking over the sparkling waters of Gitche Gumee. Suddenly he lifted up his hands toward the sun and smiled, as though he were dreaming a very beautiful dream.

Over the water, with paddles flashing in the sunlight, came a birch canoe filled with strange white men. Old Iagoo, the traveler, had already brought word of these creatures, and Hiawatha in a vision had seen the pale-faces, sent by the Great Spirit to bring the Indians a message. As the boat grated upon the shore Hiawatha stepped forward and welcomed them joyously.

"Beautiful is the sun, O strangers," he cried, "when you come so far to see us."

"Peace be with you and your people," answered the white-faced leader, who wore the long black robe of a priest.

Then the Indian leader welcomed them to his dwelling, where the important chiefs and medicine men of the village gathered to do them honor. After food had been served and a peace-pipe smoked in their honor, the priest told his message, the story of Jesus. And the Indians thanked him, saying:

"We have heard your words of wisdom. It is well for us, O brothers, that you come so far to see us."

That evening, at dusk, while his guests slumbered in his wigwam, Hiawatha stole softly out of the door.

"I am going on a long and distant journey," he told Nokomis and his people. "Many winters will vanish ere I again appear, as I am going to the portals of the sunset. See that you guard well these white strangers and listen to their words of wisdom. The Master has sent them from the land of light and morning."

Then he stepped into his canoe, turned and waved to the sorrowful group on shore, whispered to his boat, "Westward! Westward!" and sailed into the purple and gold of the sunset.

"Farewell forever, O Hiawatha!" cried his people. "Farewell!" sighed the forests and the waves and the heron in the fens.

Thus departed Hiawatha,
Hiawatha, the Beloved,
In the glory of the sunset,
In the purple mists of evening,
To the Islands of the Blessed,
To the Land of the Hereafter.



LONG ISLAND, N.Y. On the map you might picture Long Island as resembling a fish swimming along Connecticut's shore to nibble at the tempting bait of Staten Island. From its nose to the tip of its tail is about 118 miles, and the widest spread of its fins is 23 miles, the total area being about 1,682 square miles. In Long Island's head lies Brooklyn, now a borough of New York City, with more than 2,000,000 people, and the island's total population numbers more than one-fifth that of the whole state. Its granite backbone, the ridge of hills along the northern coast, twice rises to a height of about 380 feet, but elsewhere Long Island is quite low. Gardiner's and Peconic bays split the tail for a depth of 50 miles, Rocky Point forming the northern tip and Montauk the southern.

Outside of Brooklyn and its suburbs, the population of Long Island is composed of two distinct elements. There are the wealthy, drawn by the mild oceanic climate of the island, whose palatial homes make up Roslyn, Oyster Bay, and other beautiful suburban towns. Then there are the primitive inhabitants of old village stock—baymen, fishermen, and market gardeners. There are also transient summer throngs, who crowd the seaside resorts.

Long Island's mission is to house, feed, and amuse New York. The Department of Agriculture says that it is the most intensively cultivated and productive part of the eastern United States, the close neighborhood of huge markets giving the naturally poor lands immense value for market gardening.

The battle of Long Island, which took place on Brooklyn Heights, Aug. 27, 1776, is the most important event in the history of the island. This was one of the first American defeats in the Revolutionary War. As part of the defense of New York, the Americans fortified Brooklyn Heights, Long Island, where Howe attacked them on Aug. 27, 1776, inflicted a defeat, and invested the works. That night Washington took command and secured reinforcements, but two nights later he made a strategic retreat to Manhattan Island.

LONGITUDE. To help locate places on the earth, geographers use a system of imaginary lines running from pole to pole and spaced one degree apart. The "longitude" of a locality is its "east and west" location with respect to these imaginary meridians. The "north and south" location is given by parallels of latitude. (*See* Latitude and Longitude.)

Since the meridians converge as they approach the poles, the distance between adjoining meridians varies, depending upon the latitude in which it is measured. The following table gives its value for every fifth degree of latitude:

Deg. Lat.	English Miles	Deg. Lat.	English Miles	Deg. Lat.	English Miles
0	69.07	35	56.51	70	23.60
5	68.81	40	52.85	75	17.86
10	67.95	45	48.78	80	11.98
15	66.65	50	44.35	85	6.00
20	64.84	55	39.58	90	0.00
25	62.53	60	34.50		
30	59.75	65	29.15		

Loon. "As crazy as a loon" is a significant expression to one who is familiar with the uncanny cries and laughter which this bird sends ringing about the shores of the American inland lakes by day and night. The weird cry of the loon before and during a storm seems to typify the savagery of the wilderness.

MOTHER LOON AND HER LITTLE ONES



It's quite a while now since those two young loons were two brown eggs. Although the loons don't care for general society, they are great family people and the mother still keeps her half-grown babies with her to teach them things.

The loon has many other interesting characteristics. It is a most powerful swimmer and diver, and its swiftness of action frequently delivers it from death by gunshot, for at the flash of a shot it dives and is gone before the bullet can reach its mark. The loon is also a strong flyer, though it rises from the water with difficulty because of its weight, which may range from 8 to 12 pounds.

Loons are solitary birds, generally seen alone or in pairs. Their nest, with two brown eggs, is usually roughly fashioned near the water. The parents are remarkably affectionate, swimming about with the young and teaching them to race and dive; when the young grow tired, the old birds carry them on their backs. In summer the plumage is a beautiful black spotted with white, shading to pure white beneath. In winter the upper feathers are grayish brown, without spots. The food of these birds is fishes, frogs, and aquatic insects. The grievance of fish-culturists against the loon is hardly justified, as his chief diet is made up of the more worthless varieties of fish. The flesh is coarse and strong, and not good for food. The dense plumage is used for trimming women's hats.

The loon ranges through the Northern Hemisphere and only leaves the colder regions when the waters freeze. In the United States it winters in the Gulf districts. The black-throated and red-throated loons are smaller varieties with similar habits. Scientific name of common loon, *Gavia immer*.

Los Angeles, Calif. Sunny Los Angeles, the city of beautiful homes, wide lawns, and luxuriant gardens, is one of the wonder cities of the world. Thirty years ago it had a population of barely 50,000; today it is the largest and most rapidly growing city on the whole Pacific coast of the Americas, from the Arctic Circle to the tip of Chile.

The city is picturesquely situated in the foothills of the Sierra Madre Mountains, with a "shoestring strip" extending to its harbor suburbs, San Pedro and Wilmington, 20 miles away. Through all of the year the surrounding peaks look down on a scene of semi-tropical luxuriance, blooming with a wonderful growth of roses, lilies, heliotrope, and giant geraniums. Tall eucalyptus trees, graceful palms and pepper trees, and orange trees with their brilliant fruit border the wide boulevards and adorn the many parks. Smooth

VIEW FROM HOLLYWOOD ACROSS LOS ANGELES



If you want to get a "bird's-eye" view of the "Angel City," you could choose no better point from which to do so than this charming Japanese tea-garden in the suburb of Hollywood. From it a magnificent panorama of city, orange groves, and mountains is laid before you, and you catch the semi-tropical charm of southern California in all its richness.

roads lead for hundreds of miles into the surrounding country, through perfumed orange groves and over rocky heights, making the environs of Los Angeles the motorist's paradise.

Within a short distance of Los Angeles can be found every type of scenery from the tropical to the arctic. This advantage, added to the balmy climate and almost perpetual sunshine, has made the city the center of the motion picture industry of the United States and of the world. Here are made a large proportion of the film plays of the world—from "slapstick" comedies to dramatizations of literary masterpieces, and with settings ranging from the *veldt* of South Africa to the frozen plains and mountains of the Far North. More than 100 film companies have their studios here, one of them constituting a village of 250 acres. Besides contributing to the city's growth, the "movies" have given to Los Angeles a unique local color. Player folk are seen everywhere—from the high-salaried stars in their elegant limousines to the hordes of supernumeraries in grotesque make-ups. Scenes are taken in all parts of the city, and residents are no longer surprised to see "fake" robberies or murders before their doors.

But Los Angeles is not only a city of elaborate bungalows, built by the well-to-do who have flocked here to enjoy the delightful climate, of enormous tourist hotels, and of "movie" studios. It is also the commercial and industrial center of southern California. Lying in the heart of the fruit-growing section, it is the market through which $75,000,000 worth of oranges and lemons are distributed every year. It is also the headquarters of the mining industry of a considerable region, and is the center of a petroleum production which amounts to more than 100,000,000 barrels annually. Even within the city itself there are rich oil wells within a stone's throw of rose-bowered homes. Many a resident has been made wealthy by the discovery of oil, perhaps right in his backyard.

THE SACRED LOTUS



The Sacred Lotus of India is a water-lily much like the lotus of Egypt. This illustration gives you an excellent idea of the flower as it looks in bud, in bloom, and after it has gone to seed.

The cheap power derived from this fuel and from electrical plants operated by mountain streams is rapidly making Los Angeles a manufacturing center as well. There are ship-building plants, furniture factories, and other important industries including fruit canning and the manufacture of petroleum products, with a total annual output of over $600,000,000.

A favorite trip for visitors in Los Angeles is the journey to Santa Catalina Island, 25 miles out from San Pedro harbor. This island, one of the Santa Barbara group, is 25 miles long and averages 4 miles in width. Its hills and gorges are covered with beautiful vegetation, and the surrounding waters abound with fish, which makes the island a famous resort for sportsmen.

Millions have been spent to improve the harbor of Los Angeles, with the result that it has become the second largest port on the Pacific in point of tonnage. The site of the harbor was originally only an open roadstead or a broad expanse of mudflats. A great breakwater has turned the roadstead into a broad outer harbor and the dredging of the channels and slips through the mudflats has made an inner harbor with miles of waterfront and hundreds of acres of reclaimed land on which have been built terminals, warehouses, shipyards, etc. The commerce of the port now amounts to hundreds of millions of dollars a year. Large sums have also been expended to bring a water supply from Mount Whitney by a 240-mile aqueduct—the longest in the world—for city and irrigation purposes. The local and interurban electric railway system is also remarkable for its extent and excellence. There are more than 300 miles of track within the city, and 1,100 miles more connect the local system with the suburbs and points of scenic interest. Superb automobile roads radiate in all directions.

The city was founded by Spanish Franciscans in 1781, and named for a saint's day—*Nuestra Señora Reiña de Los Angeles*. In 1846 it was taken from Mexico by Commodore Stockton of the United States Navy. It received an American city charter in 1851. Population, 580,000.

Lotus. When we read in Homer's 'Odyssey' of the magical lotus fruit, which caused those who ate it to forget country, friends, and home, most of us think of the Egyptian lotus, the sacred water-lily of the Nile, with its white or rose-colored petals. But to the ancient Greeks the lotus probably meant a prickly shrub (*Zizyphus lotus*) with a sweet mealy fruit, which is still eaten in some Mediterranean districts and used for making wine. The sacred lotus of the Chinese and Hindus is a water-lily much like the Egyptian lotus. A conventionalized lotus design is a conspicuous ornament throughout ancient Egyptian, Indian, Chinese, and Japanese art.

Botanists restrict the term lotus to a genus of the pea family (*Leguminosae*), containing many species of herbs and low shrubs found in temperate regions of the Old World. A common representative is the bird's-foot trefoil of Great Britain (*Lotus corniculatus*).

LOUIS—A ROYAL NAME *in France for* 13 CENTURIES

The Story of a Long Line of Rulers, Good and Bad—Louis the Fat, Who was Great as a Fighter, a Hunter, and an Eater; a Saintly King, and a Crafty One; the "Grand Monarch"; the Weak Louis Who Lost His Head, and Many Others

LOUIS, KINGS OF FRANCE. CLOVIS (or Chlodowech), the founder of the kingdom of the Franks, 481–511, may be considered the first of the numerous French kings to bear the name of Louis. In after years the "C" was dropped, and the "v" was written as a "u," thus making our modern name of Louis. It is the same as the English Lewis and German Ludwig. But the Louis who is usually reckoned the first in France's royal line was the son of Charlemagne, who succeeded his father as king and emperor, and is called LOUIS THE PIOUS (814–840). The next four Louises, all of them of this Carolingian line, call for no mention here.

LOUIS "THE SAINT" HONORED BY HIS FOES



A king whose religion was his life, it is not surprising that Louis IX should have been one of the leaders in the Crusades. Captured by the Saracens in 1250, he was released after paying a heavy ransom. During his captivity, however, he won the admiration of his enemies by his dignity and honorable conduct. Here we see the Saracen chiefs paying homage to him at the door of his prison tent. But this tribute to his character was all that his effort finally won, for the Crusade was an utter failure.

LOUIS VI, 1108–1137, however, was of a very different set of rulers. Although he was rightly called "the Fat," he is the first of the new Capetian kings (ascended the throne in 987) who deserves to be called "great." This Louis was a great fighter, a great hunter, and a great eater, and at 46 he became too fat to mount a horse. But he remained the embodiment of warlike energy. His great task was to reduce to order the petty nobles of the royal domain, who were truly "robber barons." When Louis came to the throne every lord of a castle robbed at will, and it was not safe for even the king to pass along the road. Twenty years of hard fighting were necessary to remedy this condition, but in the end the king triumphed, and law and order prevailed. In order that such evils might not recur, every castle that was captured was destroyed or given to faithful followers.

The next two Louises were of little aid to the throne of France. LOUIS VII, 1137–1180, the monkish son of Louis VI, is remembered chiefly for the divorce of his wife, Eleanor, who then married Henry II of England. By this proceeding the rich province of Aquitaine in southern France, the dowry of Queen Eleanor, passed from the possession of the king of France to his rival, the king of England. LOUIS VIII, 1223–26, the son of Philip Augustus, reigned too short a time to accomplish anything of great importance.

LOUIS IX, 1226–1270, called "Saint Louis," is perhaps the most heroic and popular one in the whole procession of French monarchs.

He was the dutiful son of Louis VIII and his queen, Blanche of Castile, and in his education the rod had not been spared; his widowed mother often told him that she would rather see him dead than have him commit a mortal sin. She herself was a remarkable woman, who during her son's minority dauntlessly faced the numerous revolts of the turbulent nobles. In her son she was fortunate, for he possessed all the good qualities and few of the bad ones of the age in which he lived; indeed, his virtues were so remarkable that after his death the church declared him a saint. His acts of piety, however, such as wearing a hair-cloth shirt, fasting, and waiting on lepers, were usually performed in private. To the world he was a fearless knight, thoroughly trained in the art of war; a conscientious, just, and able king, who was usually good-

humored and kindly, but at times became impatient and angry; and a powerful ruler, who greatly strengthened the royal power. He improved the government by appointing local officials who were responsible to him for the administration of justice, the collection of taxes, and the government of their districts. He encouraged the people to appeal to him if the nobles oppressed them or his officials were unjust. He also improved the administration of justice by abolishing trials by combat and by using in his courts the new lawyers trained in the Roman law, in place of the churchmen who, formerly, alone could read and write. These reforms not only benefited the people but they checked the power of the quarrelsome nobles, who, according to a writer of the time, "undertook nothing against their king, seeing clearly that the hand of the Lord was with him." Saint Louis made two crusades—one to Egypt and the Holy Land (1248–54), on which he was captured and held to ransom by the Mohammedans; and the other to Tunis, in 1270, where he died of the plague.

WHAT A DISPOSITION!



An awkward, bony, ungainly creature with a long thin nose, Louis XI had a disposition as ugly as his looks. Thoroughly cynical and unscrupulous, he hesitated at no breach of honor to gain his ends. Around his shabby old hat he always wore lead images of saints, for he was pious—in his way.

Louis X ruled for but two short years, 1314–1316.

Louis XI, 1461–1483, presents a striking contrast in character to Louis IX. In appearance Louis XI was "ugly and unkingly"; in character he was unscrupulous and underhanded—a man of the Renaissance, and like his contemporaries, Caesar Borgia and Richard III, an embodiment of the principle which we call Machiavellian. He firmly believed that "he who has success has honor," and he cared nothing for the way in which he attained the success. He made promises only to break them, unless he had sworn by one particular saint—then his word was good. His one ambition seemed to be to extend the boundaries of France, and although he was too stingy to buy a new hat to replace the shabby old one he wore, he spent large sums in buying back border cities. In his conflicts with the nobles, especially with Duke Charles the Bold of Burgundy, he also acquired much territory, so that by the time of his death most of the land of France had been brought under the direct control of the king. The power of the crown in the latter part of his reign was truly absolute over the territory it held.

Louis XII, 1498–1515, is chiefly noted for the Italian wars, begun by his predecessor Charles VIII, and continued after Louis XII by Francis I.

Louis XIII, 1610–1643, has his chief claim to greatness in the fact that, in spite of all opposition, for 18 years he kept in power his able minister, Richelieu (*see* Richelieu, Cardinal). The first years of the reign were filled with anarchy and disorder, for the king was a child, and his mother, who ruled for him, was a weak and selfish woman. When Richelieu came into power, however, all this was changed. The Huguenots (*see* Huguenots) were reduced to a mere religious body, and the nobles were humbled. National unity and religious peace were secured at home, and the country was raised to the first position among the powers of Europe.

Louis XIV, 1643–1715, inherited this power, and carried it to yet further lengths. He was styled "the Grand Monarch," and his brilliant court at Versailles became the model and the despair of other less rich and powerful princes, who accepted his theory of absolute monarchy (*L'état c'est moi*, "I am the state") and would gladly have imitated Louis XIV's luxury. Until 1661 the government was largely in the hands of the wily Italian, Cardinal Mazarin. But at his death Louis declared that he would be his own prime minister, and from then until the end of his reign he worked faithfully at "his trade of a king."

A passion for fame and the desire to increase French territory in Europe were the leading motives of Louis XIV. The latter led him to neglect the opportunities to gain an empire in America and India, and involved him in a series of wars which ruined the country financially and paved the way for the outbreak of the French Revolution.

His first war (1667–68) was an attempt to enforce flimsy claims to part of the Spanish Netherlands (Belgium). His second (1672–78) was directed against

"their High Mightinesses," the States-General of Holland, who had balked him of his prey in the first contest. In spite of the great military power of France, the Dutch admiral De Ruyter twice defeated the fleets of the French and their English allies, and Louis XIV failed ingloriously in his attempt to conquer Holland. The third war also (1689–97) was directed chiefly against Holland, whose "Stadholder" had now become King William III of England. The German province of the Palatinate was terribly wasted, but the Peace of Ryswick brought only slight gains for France. Louis' last and greatest effort was the War of the Spanish Succession (1701–13) in which the English Duke of Marlborough (*see* Marlborough, First Duke of) was the chief leader of the opposing European coalition. The right to seat his grandson Philip V on the diminished throne of Spain was small compensation for the thousands of lives and millions of treasure which the French king wasted in the struggle.

THE "GRAND MONARCH" OF FRANCE



A magnificent creature, to be sure, this Louis XIV, the "Grand Monarch" in all the pomp of his royal robes! But the common people of France had to pay for all his magnificence in frightful burdens of taxation. And three-quarters of a century later another Louis paid with his life for the follies of his luxury-loving ancestors.

Millions more were spent by Louis in building the beautiful palace at Versailles, near Paris, and in maintaining his brilliant court. There etiquette "became the real constitution of France." It required seven persons, some of them the highest princes of the realm, to put the king's shirt on him at his getting up (*levée*) in the morning. A French historian says of Louis XIV: "He was a god in his temple, celebrating his own worship in the midst of his host of priests and faithful." This extravagance of the court meant a heavy burden of taxation for the common people, who were thereby reduced to a misery so great that three-quarters of a century later they rose up in rebellion and drove the Bourbons from the throne.

Louis XIV has the distinction of ruling longer than any other European king; for it was 73 years from the time when he ascended the throne as a child of less than five, until his death in 1715. He had outlived his son and *his* son, so that he was succeeded by his great-grandson.

Louis XV, 1715–1774. The luxury of the court of Louis XIV was continued under his weak successor, who came to the throne at the age of five years. The evils from which the country suffered were clearly recognized, but the king when he grew up was too lazy and selfish to try to remedy them. Misgovernment was common at home, and the position of the country abroad was lowered by the loss of her colonial possessions in India and America. These misfortunes, however, made little impression on the king or his courtiers, whose attitude was expressed in the phrase, "After us the deluge."

Louis XVI, 1774–1793. The storm broke in the reign of the just but irresolute Louis XVI. Awkward and timid, no man could have appeared less like a king than did Louis XVI, who was 20 years old when he came to the throne; and none could have seemed more out of place in the brilliant and polished court of which he was the center. Louis realized this himself, and often wished, even before the Revolution, that he were only a common man. He was a good horseman, fond of hunting, and delighted in making and mending locks. His greatest fault was that he was always ready to listen to and follow the advice of others. When this advice was good all went well; but in the latter part of Louis' reign the advice was bad and it cost the king his life.

When he first came to the throne he entrusted the management of the finances of the kingdom to Turgot, one of the greatest of statesmen, and as long as the king followed his minister's advice, the state of the kingdom was improved. But he was more often under the influence of the beautiful but frivolous and extravagant queen, Marie Antoinette, and of the selfish courtiers. These all opposed any financial reforms which would threaten their "graft" and pensions and life of ease, and they soon persuaded the king to dismiss his able minister.

The Beginning of the Great Revolution

From this time on things went from bad to worse, and finally Louis XVI was forced to call the Estates-General, a body which had not met since 1614. Its meeting was the first step in the French Revolution (*see* French Revolution). The members of the third

estate refused to follow the old method of voting, and finally declared themselves a national assembly.

At first the king seemed inclined to work with the Revolution and try to remedy conditions in the country. But the influence of the queen and of the courtiers proved too strong for his feeble will. Encouraged by them, he disregarded the promises he had made, and sought to flee from France that he might obtain aid against the revolution from Austria.

This attempted flight was the beginning of the end. The people saw that they could not trust the king and the "Austrian woman," as they called the queen. His disregard of his promises to abide by the constitution led to the storming of the royal palace of the Tuileries on Aug. 10, 1791. The king and his family escaped before the mob arrived and took refuge in the hall of the Legislative Assembly. That body declared the king was suspended from office and ordered that he and his family should be imprisoned. They then called a new assembly (the Convention) to decided whether France should continue to be a monarchy.

"THE LOST DAUPHIN"



When his father, Louis XVI, was executed, the boy Louis Charles was placed in solitary confinement. Although the authorities claimed that he died there, many royalists believed that the dead child was a substitute, and that the real prince or "dauphin" had been spirited away. Although he never reigned he is known to history as "Louis XVII."

The convention first decided against a monarchy, and declared the king deposed. They then brought Louis XVI to trial on the charge of combining with foreign countries for the invasion of France. Almost unanimously Louis Capet, as he was now called, was declared guilty and was sentenced to death. The next day he was beheaded, meeting his fate with a steadfast courage, and proving greater in death than he had ever been in life. His son, the little Dauphin, who soon perished mysteriously in prison, is counted as Louis XVII, although he never ruled. The execution of Louis XVI had important consequences for France, for it aroused opinion in other countries against the French Revolution.

Louis XVIII, 1815–1824. When the Bourbons were restored to the throne of France by the Allies in 1814, the younger brother of Louis XVI assumed the crown as Louis XVIII. The difficult task of reconstruction was before the king, but he seemed admirably adapted to meet the situation. He was cold-blooded and cared nothing for revenge, therefore he was satisfied to leave alone those who had driven his family from France. He was a lazy man, and his one ambition was to keep his throne. This ambition seemed likely at first to go unfulfilled, for in 1815 Napoleon returned from his island empire of Elba, and Louis XVIII fled in a panic from France. At the end of the Hundred Days, however, Napoleon was again overthrown, at Waterloo, and the Allies entered Paris, "bringing Louis XVIII in their baggage."

Until 1820 the king was able to resist the demands of the extreme royalists for vengeance, and to build up his kingdom, but finally under the leadership of his brother they became too strong for him. His yielding to their demands for a reactionary government marks the beginning of the end of the Bourbons, for 10 years later, under his brother, Charles X, they were driven finally from the throne of France.

Louis Philippe, 1830–1848. Having disposed of the Bourbons, the French had to set up a new government. Influenced by Lafayette (*see* Lafayette, Marquis de), they decided to keep France a monarchy, with Louis Philippe, a member of a family related to the Bourbons, as king.

Louis Philippe was known for his democratic ideas, and was given the title of the "Citizen-king." He walked the streets of Paris alone, carrying a green umbrella and talking with strangers, and his children were sent to the public schools. But his government was undemocratic, and the people were not better off than before. Only the wealthy had profited by the Revolution of 1830. Demands for a more liberal government were refused by Louis Philippe, and his minister, Guizot.

When finally the government forbade a reform banquet which was to be held on Feb. 22, 1848, the Republicans of Paris revolted. Guizot was forced to resign, but this did not satisfy the rioters, and Louis Philippe abdicated on Feb. 24. Then he fled to England, where he died two years later.

"CHILD *of the* MISSISSIPPI," *Sunny* LOUISIANA

Extent.—North to south, 281 miles; east to west, 275 miles. Area, 48,506 square miles, 3,097 square miles being water. Population (1920 census), 1,798,509.
Natural Features.—Surface low, about one-third alluvial and marsh land; extreme height in northwest about 500 feet above sea-level. Principal rivers: Mississippi and its tributaries; Red River, Ouachita, Sabine, Calcasieu.
Products.—Corn, rice, cotton, sugar cane; lumber; petroleum, sulphur, natural gas, salt; fish, oysters; lumber, sugar, and cotton-seed manufactures.
Principal Cities.—New Orleans (390,000); Shreveport (45,000); Baton Rouge (capital, 22,000).

LOUISIANA. The child of the Mississippi, Louisiana is built of deposits laid down by the river on the floor of the Gulf of Mexico in ancient days when the gulf extended up to where Cairo, Ill., now stands. But its rich soils are the slightest part of the state's inheritance from the Father of Waters, for it guards the gate of a river valley far vaster in extent and possibilities than any of those on which old-world empires were built. Its port, New Orleans, looking southward over the "American Mediterranean," is the second port of the United States, by virtue of its location near the mouth of the Mississippi, and enjoys good prospects of becoming the trade link between the entire Mississippi valley and South America.

From low plateaus and flat-topped hills, with an elevation of about 400 or 500 feet near the Arkansas line, the land slopes gently southeastward, through "bluffs" and prairies, to the wooded swamps, "quaking prairies," and grassy marshes of the coast. The whole surface is fretted with waterways—rivers and sluggish bayous or secondary river outlets, bays and lakes, some of which are merely land-locked bays or lagoons opening to the Gulf. Much of this is navigable water, except where choked with the water hyacinth and other vegetation; in fact, of the 64 "parishes" (subdivisions) of the state, it is said that only four are without navigable water communication. The rivers have built up their beds until they flow on the summits of low broad ridges; of the alluvial lands on either side, the highest portions are the banks which the streams have built for themselves and often seek to overflow. The Mississippi, a capricious and irascible benefactor, tries every spring to take back the lands which it has created, and hundreds on hundreds of miles of strong levees are required to protect the low-lying plantations and farms against it and against the Red and other large rivers.

A Picturesque Wilderness

Picturesque old cities, brisk thrifty new towns, broad plantations and prosperous little farms, claim only a portion of the land. Along many a remote bayou alligators and snakes still sun themselves peacefully on the knees of the ragged cypress, with its long beard of gray Spanish moss waving above the black water. The marshy coast fringe, once a haven for pirates, smugglers, and other outlaws, is still a fragrant and flowery wilderness of grass, cane, palms, gum trees and live oaks, a refuge for canvasback and other ducks, pelicans (Louisiana is called the "Pelican State"), and cranes. While some marshy lands are being reclaimed for agriculture, Marsh Island and some other wild tracts have been given to the state as a perpetual refuge for wild life.

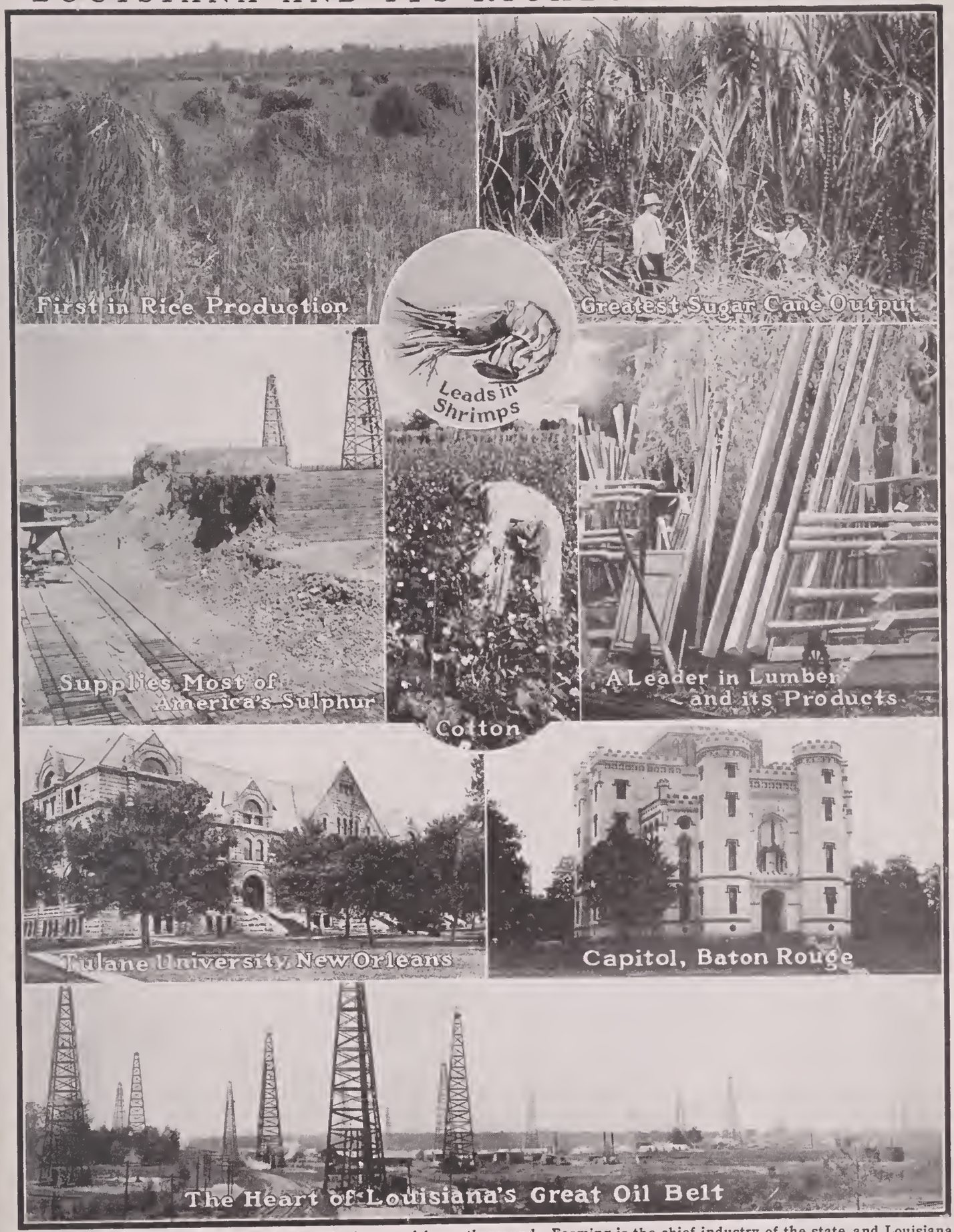
Its wonderfully fertile soils and subtropical climate make Louisiana preëminently adapted to agriculture. The chief crops are corn, rice, cotton, and sugar cane. Cotton, long the chief sale crop, has tended of late to give way to the other staples and to a more diversified agriculture, but it still dominates the region north of Red River.

Rice, a crop in which Louisiana leads the Union, is grown on the coast marshes and alluvial prairies in the southwestern part of the state. Until 1897 practically the whole crop was "Providence" rice; that is, rice grown by no other water supply than rainfall. Two years of drouth caused a change in methods, and now rice is grown on what are known as "pump lands" by irrigation with water pumped up from bored wells into channels made by throwing up parallel dikes. Corn can be grown anywhere in the state, and the yield on alluvial and reclaimed marsh lands runs as high as 100 bushels to the acre. Sugar cane, grown both for sugar and for syrup, is the distinctive crop of Louisiana. The state produces more cane sugar than all the other cane-growing states of the Union. Sugar cane for sugar demands rich soil and rather expensive care; it is grown chiefly on large plantations and on alluvial and reclaimed marsh lands in the southern part of the state. Sugar cane for syrup is less exacting; it is grown farther north, on poorer soil, and by small farmers.

Art of Sugar-Making Learned

The man who showed that good sugar could be made from Louisiana cane was the savior of the colony in the 18th century, when its then chief money-making crop, indigo, was attacked by a destructive worm. The Jesuit fathers had introduced sugar cane in 1751, but the only sugar which anyone had succeeded in making from it was wet, brown, and unfit for export. Louisiana planters were faced with ruin when Étienne de Boré put all his means into sugar cane, and in 1794 succeeded in producing pure white crystalline sugar, thereby revolutionizing the agriculture of the colony. An important feature of the present state university, at Baton Rouge, is the Audubon Sugar School "for the highest scientific training in the growing of sugar cane and in the technology of sugar manufacture."

Among the more important minor crops are hay, oats, peanuts, oranges, kumquats, and other subtropical and temperate zone fruits; nuts, especially pecans; Irish and sweet potatoes, the latter of increasing importance since growers have learned to enhance their keeping qualities and market value by drying in "curing houses." Louisiana has been called the "Holland of America," not only because of the importance of its dikes, but because of the prominence



Nature has been bountiful to Louisiana both above and beneath ground. Farming is the chief industry of the state, and Louisiana cotton, cane sugar, and rice are important factors in the markets of the world. The state also exploits the fisheries in the Gulf, with particular success in shrimp fishing, and possesses great resources of timber. Louisiana also has great oil fields in the southwest, and a tremendously rich sulphur mine discovered near Lake Charles before 1870. The mine has been exploited since 1900 by pumping hot water into it. Compressed air is then forced down a central tube and the pure melted sulphur is forced to the surface through an encircling tube. The state shares with Sicily the dominant position in the world sulphur market. Tulane University, the largest institution of learning, and the state Capitol fittingly represent Louisiana's old traditions.

contained in the Easy Reference Fact-Index at the end of this work

of the trucking industry. "Tangipahoa strawberries," grown in the strip running north from between lakes Maurepas and Pontchartrain, are famous; cabbages are a specialty on the lower Sabine River; tomatoes on the upper Ouachita, around Monroe; and potatoes and cantelopes in the northwestern corner of the state. Such crops are grown all the year round, but particularly in winter for the Northern markets. Tobacco is grown to a limited extent. The famous Perique tobacco, used for seasoning fancy blends, is grown on a little tract of a few hundred acres on the banks of the Mississippi southwest of Lake Pontchartrain and nowhere else in the world. Stock-raising and wool-growing, hitherto neglected industries to which soil and climate are admirably adapted, are being pushed as part of the campaign for diversified farming.

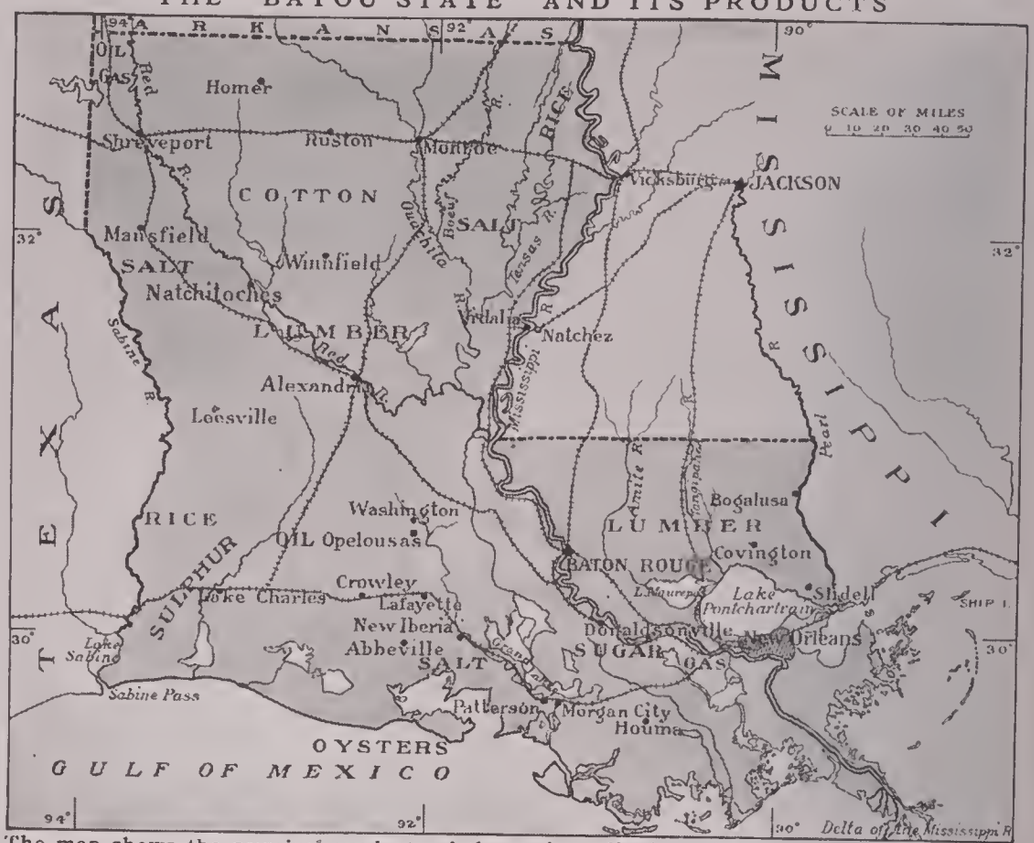
With all its advantages for agriculture, much less than half of Louisiana soil is in farms, and only about a quarter is improved. There is a progressive tendency toward subdivision, and the average farm is well under a hundred acres in size. Yet there are still thousands of plantations of more than a thousand acres each.

The long-leaf pine forests of the east and southwest, the short-leaf pine of the northwest, the cypress of the alluvial and overflowed lands of the south, and the hardwoods of the river bottoms throughout the state comprise immense wealth and have made Louisiana the second lumber state in the Union. Spanish moss is harvested and sold as packing and as a substitute for hair in stuffing mattresses and furniture.

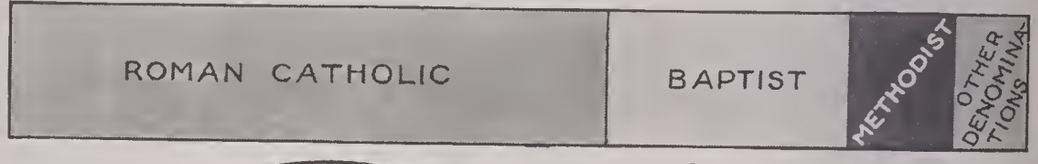
Fish swarm in the Louisiana waters. The state produces more shrimps than any other, and its oyster fisheries are second only to those of Chesapeake Bay. The raccoons, opossums, and other fur-bearing animals of the state are of considerable value; they and the birds have been placed under the protection of the State Conservation Commission.

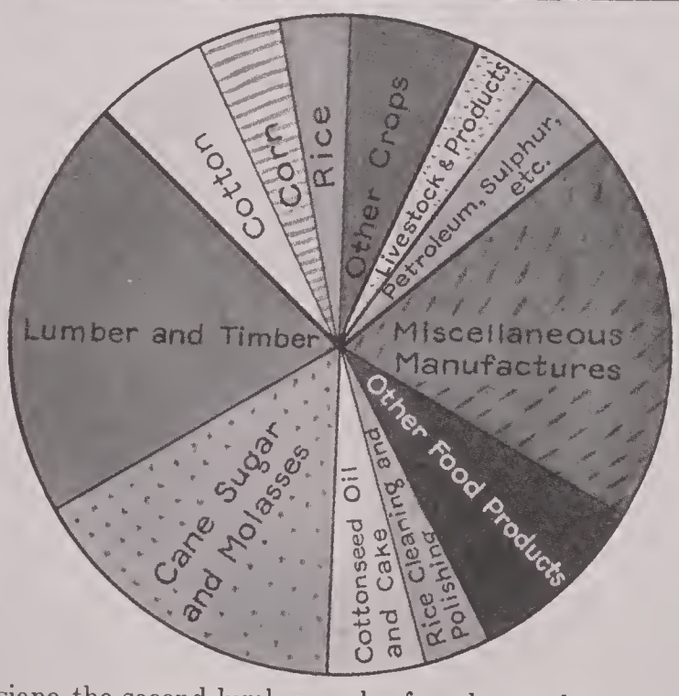
From the southwestern corner of the state near Lake Charles comes nearly all the sulphur produced in the United States (*see* Sulphur). Salt of extraordinary purity is mined in great quantities in the "islands" (island-like hills scattered in the marshes) near Vermilion Bay, and is also found near the center of the state. But the most important minerals are the natural gas and petroleum found in the large and productive fields near Caddo, Jennings, and Shreveport. Natural gas as a cheap fuel has helped to build up the manufactures of Shreveport, the state's second largest city.

THE "BAYOU STATE" AND ITS PRODUCTS



The map shows the principal products of the various districts of Louisiana. Below we see the relative sizes of the religious denominations in the state, and the comparative value of the agricultural and industrial products.





IN THE GAY SEASON OF THE MARDI GRAS



This is a scene in New Orleans during the festival of Mardi Gras, immediately preceding Lent. At this time, the people of the great Louisiana city throng the streets in gay costumed crowds, swelled by thousands of visitors from all parts of the United States. Here we see a float in one of the famous Mardi Gras processions.

Most of the manufactures are centered in New Orleans, but the largest industry (lumber manufacture), in which Louisiana stands second only to the state of Washington, is rather widely scattered. The largest sawmill in the state, if not in the United States, with a capacity of 1,000,000 feet a day, is in Bogalusa, in the northeast corner of that portion of the state which lies east of the Mississippi River. Cane sugar manufacture, in which Louisiana holds first place, the manufacture of cotton-seed oil and cake, the cleaning and polishing of rice, and the manufacture of food preparations—an industry which has had wonderful recent growth—are among the other important industries. Shreveport claims to be the largest fertilizer manufacturing center west of the Mississippi, and to possess the largest cotton press in the world. Baton Rouge, the state capital—a picturesque and historic old French-Spanish town—is the site of the largest Southern oil refinery, and exports more oil than any other Southern port. Kaolin deposits support a healthy clay products industry.

With its 3,000 miles and more of navigable waters, making a web of paths to the ocean, Louisiana is one of the richest states in the Union in natural highways. Yet all the rest of these waterways put together are not worth the 600 miles of the Mississippi within the state, and especially the control of its outlet to the ocean. Before the coming of the railroads New Orleans was the mart through which practically all the commerce of the whole Mississippi valley must pass. Elsewhere are described the factors which will give it immensely increased importance in the future, when the north-and-south tide of continental commerce becomes comparable to that which now flows east and west (*see* New Orleans). Railroad facilities, rather scanty until recently, have nearly doubled within the last few years, and water competition has resulted in cheaper freight rates.

The early history of the state is reflected not only in the many French and Spanish names on the map, but also in the strong French and Spanish elements in the population, customs, and architecture—especially in New Orleans, Baton Rouge, and other old towns—and even in the Latin basis of the state laws. Louisiana is the only state in the Union in which the legal system is not based on the English common law. When under the control of Spain, the colony had of course been governed in accordance with Spanish laws. In that portion of the Louisiana Purchase which forms the present state of Louisiana, the United States Federal government promised not to alter the established legal system. The old Spanish laws and the then recently promulgated Napoleonic Code of France were both used by Edward Livingston and his associates in compiling the Louisiana Code between 1805 and 1824. Louisiana criminal and commercial law is largely based on English precedent, but the civil law remains chiefly French and Spanish

The name "parish" for the administrative divisions of the state (known in other states as counties) is a localism of only historical significance; the parishes, however, were originally based on Spanish divisions for the purposes of the church.

Health conditions in Louisiana have been revolutionized since the discovery of the part played by the stegomyia mosquito in spreading yellow fever. A progressive state board of health has been very active in carrying instruction in health and hygiene to the people by means of "health cars" and other educational devices.

The state institutions of higher learning include the State University and Agricultural and Mechanical College at Baton Rouge, Tulane University at New Orleans, a number of colleges under sectarian control, and four universities for colored people.

The History of Louisiana

When La Salle descended the Mississippi River, in 1682, he took possession in the name of France of the vast unknown region drained by the river, which he named Louisiana in honor of Louis XIV. Returning with a colony in 1684, he failed to find the river's mouth and landed in Texas, where he was murdered. The honor of laying the foundation of the colony fell to the Canadian Pierre Le Moyne d'Iberville, who in 1699 made the first settlement within the present state limits, and whose brother Bienville founded New Orleans. As a financial speculation Louisiana was a bitter disappointment to Antoine Crozat, who held it under royal grant from 1712 to 1717; to the creditors of John Law's "Mississippi Company," the next promoter; and to the crown, which resumed control in 1732. The most spectacular failure was that of John Law, who had promised to pay the French public debt with the proceeds of the exploitation of the colony; the expectations of profit were so enormous that there was frenzied speculation in Paris, known after his downfall as the "Mississippi Bubble."

As a result of the Seven Years' War, France in 1762 ceded New Orleans and the vast region west of the Mississippi to her ally Spain. The French colonists at the mouth of the Mississippi, amazed, aggrieved, and indignant at being cast off by the mother country, and fearing besides financial disaster in the loss of the French market for their indigo, drove out Ulloa, the first Spanish governor, in 1768, but they were repressed with an iron hand by his successor, and settled down to endure what proved to be, for an 18th century Spanish colony, a fairly liberal rule. After the American Revolution, the hardy Western boatmen and traders from the fast-growing country between the Alleghenies and the Mississippi poured their produce into New Orleans in an ever-increasing stream and were continually exasperated at the heavy customs duties levied. Threats of Western secession on the one hand, and of filibustering seizure of New Orleans by the Westerners on the other, were equally alarming to the statesmen of the young American republic and to the governors of the Spanish colony. The cumulative pressure on the Federal government resulted in the American purchase of Louisiana in 1803 from the French, who had re-acquired it by secret treaty from Spain in 1800 (*see* Louisiana Purchase). In 1804 Congress divided Louisiana into the District of Louisiana north of latitude 33°, and the Territory of Orleans south of that parallel. In 1812 the Territory of Orleans was admitted to the Union as the state of Louisiana, with the addition of the "Florida parishes"—that part of the Spanish province of West Florida lying between the Pearl and the Mississippi rivers, which had rebelled against Spanish rule in 1810.

Louisiana's vote of secession in 1861 brought into the Confederacy the largest city in the South, with more machine shops and trained workmen than any other. From a military point of view the state's command of the mouth of the Mississippi gave it overwhelming importance. Farragut's capture of New Orleans and Baton Rouge (*see* Farragut, David Glasgow) opened the lower Mississippi to the Federal forces. During the war the portions of the state under Confederate and Federal control, respectively, were each organized with a state government. "Carpetbag" rule during the reconstruction period was, if possible, more corrupt and extravagant in Louisiana than in most of the other Southern states. Louisiana was one of the Southern states which in 1876 elected two rival sets of presidential electors—one representing the "White League" government and the other the carpet bage lement—and so brought on the Hayes-Tilden disputed election. Freed of its burden of financial misrule of the Reconstruction period, the state has been able to build up substantial prosperity, particularly since the efforts of sanitarians have freed it from the recurrent danger of epidemics of disease.

LOUISIANA PURCHASE. In 1801 President Jefferson set the example of acquiring new territory by purchase rather than by war when he bought from France the vast tract of land known as Louisiana. The United States did not differ from Old World countries in wishing to reach her "natural boundaries"; she did differ in the method she used.

The city of New Orleans was greatly desired by all the people beyond the Alleghenies, for the nation that controlled this spot could control the Mississippi River. Western farmers were anxious that this control should be in the hands of the United States, for their grain, hogs, cattle, and other produce were chiefly marketed by flatboats which floated down the great "Father of Waters."

Spain had held this important gateway of the West ever since the end of the French and Indian War, in 1763; when suddenly, in 1802, news came that the mighty Napoleon had forced that weak country to give New Orleans and the whole Louisiana territory to the all-conquering French. This was bad news for the western farmer, for France was then the most powerful country in the world, and there was no hope of forcing from her any privileges.

Napoleon's dream of a vast colonial empire vanished, however, almost as suddenly as it had come. England took up anew the struggle in Europe, and it was folly for France to try to hold distant territory while England controlled the seas. Robert Livingston, the American minister to France, pointed out to Napoleon this fact, and in spite of all protests that monarch decided to sell Louisiana.

When, therefore, James Monroe arrived in France with power from President Jefferson to purchase New Orleans and West Florida for $2,000,000, he was offered the *whole* of the French territory for payments estimated at $15,000,000. Although the American agents had no authority to make such an extensive purchase, nor to spend so much money, they signed the treaty of purchase on April 30, 1803. In December the French flag was hauled down from the old government buildings in New Orleans, and the Stars and Stripes were hoisted as a sign that the vast domain of Louisiana had passed under the dominion of the United States.

Thus at one stroke the area of the United States was doubled. President Jefferson believed that the annexation and government of so vast a territory was unconstitutional, and wished to have an amendment to the Constitution adopted ratifying it. His cabinet did not think this necessary and their views prevailed. The New England Federalists were enraged at the prospect of the admission of numerous new states, whose votes in Senate and House would reinforce those of the South and West; and some, like Josiah Quincy, openly advocated secession—"amicably, if they can; violently, if they must." But the people generally approved of the purchase, as well they might! Fourteen of the 48 states now in the Union were included in the purchase either in whole or in part, and the value of this land lying between the Mississippi River and the Rocky Mountains is now more than 400 times greater than the price paid for it. (*See* historical map which accompanies the article on the United States.)

LOUISVILLE, KY. Because it has one of the finest landing places on the Ohio River, which here at the falls stretches away in a sort of lake a mile wide and six miles long, Louisville was the Gate City of the South in the old days and is known also as the Falls City. It is still a gateway to the South by reason of its railway facilities, which make it a great distributing center. The nearness of the Kentucky coal fields, with cheap river transportation from the Pennsylvania and West Virginia fields, provides its thriving industries with abundant fuel at low cost.

The city was founded in 1778 by George Rogers Clark as an outpost against the British, and became an important river port from the introduction of steam navigation on the Ohio, and still more with the opening of the canal around the falls in 1830. It is today perhaps the largest leaf-tobacco market in the world, besides being the largest city in Kentucky, and the chief manufacturing city of the state, producing tobacco in its various manufactured forms, Louisville and portland cement, plows, stoves, wagons, furniture, leather, soap, "Kentucky jeans" clothing, smoked hams, packed meats, and many other wares. The Kentucky Derby, one of the great races for running horses in America, is held here every May. One of the local papers, the Louisville *Courier-Journal*, has had a succession of brilliant editors, the most recent being Henry Watterson. The city supports the University of Louisville as a municipal university. Population, about 235,000.

LOUVAIN (*lo͞o-văn'*), BELGIUM. "In this dear city of Louvain, perpetually in my thoughts, the magnificent church of St. Peter will never recover its former splendor. The ancient college of St. Ives, the art schools, the consular and commercial schools of the university, the old markets, our rich library with its collections, its unique and unpublished manuscripts, its gallery of great portraits—all this accumulation of intellectual, of historic, and of artistic riches, the fruits of the labor of five centuries—all is dust." So wrote Cardinal Mercier after the deliberate burning of Louvain by the German army, Aug. 25 to 27, 1914—an act which, while of no material benefit to Germany, did much to rouse the spirit of the Allies. Over 1,120 houses in the richest sections of the city were burned. Even if it were true, as Germany charged, that the citizens of Louvain had intended to attack the invading troops, the destruction of old irreplaceable treasures and the punishment of innocent citizens for the sake of terrorizing the guilty cannot be defended.

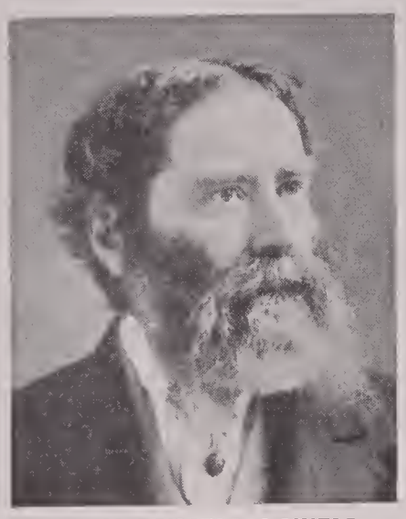
This picturesque town on the Dyle River, distant some 15 miles from Brussels, with its jumble of quaint houses and general air of aloofness from modern life, seemed even before the war to belong to the past rather than the present. Its chief interest for travelers lay in its town hall, one of the most beautiful Gothic buildings in the world; the famous Catholic university, at one time the most noted in Europe; and the university library, with upwards of 150,000 volumes, including many priceless old manuscripts and early printed books. In the 14th and 15th centuries, when Louvain was at the zenith of its prosperity, it was one of the principal cloth-making centers in Europe. Since then its decline has been rapid and its population has greatly decreased. Brewing and distilling and the manufacture of tobacco, lace, and starch are the most important industries. Population, about 40,000.

LOWELL, JAMES RUSSELL (1819–1891). "If writing poetry were a profession I should be a poet," Lowell declared when at 19 he was graduated from Harvard. Realizing that poetry alone would never earn him a living, he tried, though unsuccessfully, to follow the law. His friendship with Maria White was also a stimulus toward literature. Being a poet herself of no mean gifts, she sympathized with Lowell's tastes and encouraged him to continue writing. They married in 1840, and although for many years they had

little money, they were very happy. Lowell wrote some of his best poems, such as 'The Vision of Sir Launfal' and 'To a Dandelion' at this period.

There was another side to Lowell's nature which the stormy times just before the Mexican War in 1848 could not fail to arouse. Believing that he saw the United States about to enter an unjust war for new territory, into which slavery might spread, he expressed his disapproval in a series of poems in Yankee dialect called 'The Biglow Papers'. These contain much of the moral force, sly humor, and close-packed phrases of the New England farmers and small-town people. In the first number he makes his "Mr. Biglow" write:

They may talk o' Freedom's airy
Tell they're pupple in the face,—
It's a grand gret cemetary
Fer the barthrights of our race;
They jest want this Californy
So's to lug new slave-states in
To abuse ye, an' to scorn ye,
An' to plunder ye like sin.



JAMES RUSSELL LOWELL
Writer and Diplomat

Besides "Mr. Biglow," Lowell also speaks satirically through a ridiculous, unprincipled, but shrewd Yankee politician and amateur soldier, whom he names "Birdofredom Sawin."

Not all the 'Biglow Papers', however, were political. The following from the poem entitled 'The Courtin' is pure New England pastoral:

He kin' o' l'itered on the mat,
Some doubtfle o' the sekle,
His heart kep' goin' pity-pat,
But hern went pity Zekle.

He stood a spell on one foot fust,
Then stood a spell on t' other,
An' on which one he felt the wust
He could n't ha' told ye nuther.

Says he, "I'd better call agin;"
Says she, "Think likely, Mister:"
Thet last word pricked him like a pin,
An' . . . Wal, he up an' kist her.

When Ma bimeby upon 'em slips,
Huldy sot pale ez ashes,
All kin' o' smily roun' the lips
An' teary roun' the lashes.

To the period of the Mexican War also belongs Lowell's noble poem, 'The Present Crisis', with its famous concluding stanza:

New occasions teach new duties; Time
makes ancient good uncouth;
They must upward still, and onward, who
would keep abreast of Truth;
Lo, before us gleam her camp-fires! we
ourselves must Pilgrims be,
Launch our Mayflower, and steer boldly
through the desperate winter sea,
Nor attempt the Future's portal with the
Past's blood-rusted key.

The busy productive years following Lowell's marriage were much shadowed by family afflictions. His wife, whose health had long been delicate, died in 1853. But his literary work had gained him fame, and in 1855 he was asked to give a series of public lectures in Boston. His success led to his being offered the professorship in French, Spanish, and general literature at Harvard. He accepted the chair but asked for the opportunity to go to Europe for a year in order to renew his knowledge of modern languages. On his return he married Miss Frances Dunlap, who had been acting as governess for his daughter, and settled down to a serene and busy life in which teaching and writing shared his attention.

In 1857 he became editor of the *Atlantic Monthly* for four years. Even after resigning that post he contributed his poems largely to that magazine, his prose writings going to the *North American Review*. During the time that he was on the Harvard faculty, prose was his usual method of expression, perhaps because he was older and possibly because academic life checked the more spontaneous flow of poetry. He wrote largely travels, criticism, literary and political essays, including work of such keen insight that he has been ranked by many as America's leading critic. 'On a Certain Condescension in Foreigners' and 'Keats' are among his most refreshing and characteristic essays. His literary criticisms were particularly valuable because, like much of Longfellow's work, they helped acquaint Americans with Europe's literary riches, at a time when growing interest in literature made the influence most valuable.

He did write some poetry in this period, however, and one effort is of very great merit. The 'Commemoration Ode', written in 1865 in honor of the Harvard soldiers fallen in the Civil War, is a stirring piece of work. He himself felt that he "had written something really good at last." The passage on Lincoln is one that we should not like to lose from American literature, so clearly does it express, along with his admiration for the great man of the people, Lowell's real love for true democracy.

In 1877 Lowell was called from his university work to become the United States minister to Spain, later exchanging this post for that to England. In the latter position he did much to bring the two countries more closely into sympathy. His charm of manner and his power of making clever impromptu speeches made him popular in British society.

The last years of his life were spent at his birthplace in Cambridge among his books and friends. He died honored as a poet, essayist, and a man of distinguished public service, not only in America, but also in England, where his bust has been placed in Westminster Abbey.

Among Lowell's prose works are 'My Study Windows' (1871); 'Among My Books' (1870); 'Among My Books, Second Series' (1876).

For any subject not found in its alphabetical place see information

Lowell, Mass. One of the oldest of the great American industrial cities, Lowell was founded in 1822 by the Merrimac Manufacturing Company, and was named in honor of Francis Cabot Lowell, who had improved Cartwright's power loom. This corporation bought a site at the junction of the Concord and Merrimack rivers and set about harnessing the 32-foot falls of the Merrimack, drawing the water through seven and a half miles of canals to various factories. Today those canals develop 30,000 horsepower daily. This tremendous water power is supplemented by great steam plants.

Lowell was chartered as a city in 1836 and has called itself ever since "The Workshop of the World." It contains some of the world's largest cotton mills and the most extensive hosiery and underwear factories, besides tanneries, woolen, worsted, felt, and carpet factories, and bleaching and dyeing works, which combine to make it one of the greatest textile centers in the United States. Lowell has had since 1897 the most famous textile school in America. The courses in cotton manufacturing, wool manufacturing, designing, chemistry, and dyeing, supplemented by evening drawing schools, and manual training in the public schools, have helped bring about a high degree of technical perfection in the factories.

The artist Whistler was born in Lowell and his old home is now an art museum. Population, about 115,000.

Loyola (*loi-ō'lȧ*), Ignatius de (1491–1556). Until his leg was shattered by a cannon-ball at the siege of Pampeluna (1521), the future founder of the Jesuit Order and the greatest opponent of Luther's teaching, was known only as a courtly Spanish nobleman and soldier. The reading of the lives of the saints during his long convalescence turned him from the quest of military glory and made him a soldier of Christ. His sword and dagger he hung up on the altar of a monastery chapel. His worldly garments he gave to the poor, taking a pilgrim's dress of sackcloth and hempen shoes, with a staff and gourd. Seven hours a day he spent on his knees in prayer and thrice a day he scourged his wasted body.

With difficulty Loyola reached Jerusalem, but he was not allowed by the authorities to remain and labor there as he had planned. Back in Spain, at the age of 32, he again became a schoolboy to learn the Latin needed for his religious studies. The next ten years he spent at schools and universities in Spain and in Paris. Again and again he was suspected of heresy and was imprisoned—at times loaded with chains—by the Inquisition for teaching before he had completed the prescribed studies.

Meanwhile his plans were taking more definite form. He would found a "Society of Jesus"—spiritually drilled and disciplined like a military company—to combat heresy and do missionary work in heathen countries. The members should be bound by the monastic vows of poverty, chastity, and implicit obedience, but they should wear no distinctive dress and should not be tied down by minute monastic rules or unusual forms of discipline.

In 1534, at Paris, Loyola and his six companions formed the beginning of this organization. In 1540 its members received at Rome the sanction of the pope, and Loyola became its first "general" or commanding officer. The remainder of his life, until his death at Rome in 1556, was spent in working out, with infinite skill, the constitution of his order, and preparing it for that conflict with the Protestant Reformation in which the Catholic church was to win back half the lands which it had lost through Luther's revolt. In 1628 Pope Gregory XV canonized him as St. Ignatius of Loyola.

One of Loyola's earliest associates was Francis Xavier (1506–52), a native of Spanish Navarre, who spent the last ten years of his life as the first great missionary to the Far East—the Indies, Japan, and China. (*See also* Monks and Monasticism; Xavier, Francis.)

Lucknow (*lŭk'now*), India. Lucknow will go down in history for the heroic sieges it sustained in 1857, when it was held by a small British force, first under the command of Sir Henry Lawrence, a noted Indian soldier and administrator, and after its first relief, under the command of Havelock and Outram.

When the storm of the Sepoy Mutiny broke in June 1857 Lawrence retreated, after a preliminary skirmish with the rebels, to the British Residency in Lucknow. The building was the official house of a British commissioner in the province of Oudh. Lawrence put it into a state of defense, entrenched the surrounding 60 acres with its outbuildings, and defied the rebels. His force consisted of 1,720 men, of whom 712 were loyal Indian soldiers, and 153 British civilians. He had to defend 1,280 old men, women, and children, without artillery or a great supply of ammunition. He died from a wound in the early part of the siege, which lasted from July 1 to September 25. On this date Gĕnerals Havelock and Outram with about 1,000 men relieved the defenders, now reduced to less than a thousand. The combined forces could not cut their way out and the siege went on. Havelock grew sick, and Outram carried on the defense against the rebel army of 60,000. The situation was desperate. Then from the top of the Residency they saw the signals of Sir Colin Campbell, the hero of "the thin red line" at Balaklava. Campbell recaptured Lucknow and on November 17 broke through and joined forces with the weary defenders in the Residency on the plateau above the city. Havelock died soon after the relief. The Residency, like the fatal well at Cawnpore where the mutineers threw the remains of the massacred British women and children, is preserved as a memorial.

Lucknow is today a great manufacturing and railroad center, and the headquarters of a British army division. There are many secular and missionary schools for European and Indian children. Population, about 260,000.

Ludendorff, Erich von (1865–). Hindenburg was the idol of the German people during the World War of 1914–18, but General Ludendorff was the chief thinker and driving force in German military policy. Before the war he was head of the Operations Department of the General Staff, where he had a hand in shaping Germany's military preparations. At the outbreak of hostilities he took part in the attack on Liége, and three weeks later was sent to Russia as chief of staff to Field Marshal von Hindenburg. These two, the "brain" and "arm" of the German army, were for a time the real masters of Germany. It was Hindenburg who received the credit for the victories; it was Ludendorff, bent double over his maps and papers, who planned the campaigns. He took part in the operations against Russia in 1915–16 which forced their evacuation of Russian Poland, and he was responsible for the swift and highly successful Rumanian campaign. It was not until the German offensive of 1918, his final effort, that this "German Napoleon" met his Waterloo. After the crash in November 1918, he resigned his post. He later published 'My Own Story', his personal account of the triumphs and final failure of Germany.



Lumber. Although lumber has been replaced in the building of large structures by iron and concrete, the demand for it is constantly growing. The list of its uses is a long one. In the building of houses and smaller buildings wood is still used to a great extent and even in great modern office buildings wood is generally used for doors, floors, etc. Billions of cords of spruce and other woods are used yearly in the manufacture of paper. No good substitute has ever been found for wood for railroad ties, and these must be replaced every few years. Wooden ships still sail our rivers and engage in coastwise traffic, while, just for matches, many million feet of pine lumber are cut every year in the Great Lakes district alone. The development of the airplane has led to new demands for spruce timber—especially the Pacific coast varieties—for the making of airplane frames and propellers. And when we think of the telegraph and telephone poles, the furniture made from the beautiful hardwoods, the shingles, barrels, and boxes that we use, it is not hard to realize that the timber industry in the United States is a very important one.

Fortunately a large portion of America is still wooded. There are timberlands in the East and "wood-lots" wherever one may go. In the West there are finer forests, for the West is the home of great trees. Although little more than a quarter of the United States is now covered with forests, it has still more woodland than any other country in the world, except Russia. After Russia and the United States, Canada is next in extent of its wooded territory.

Each lumber region has methods adapted to the particular conditions that exist there. Specially heavy machinery is used in the West where the trees are so large. But it is up in the north woods of Wisconsin, Michigan, Minnesota, and eastern Canada that lumbering is most picturesque. Here the work is done when the forests are locked in the winter's ice and snow, and the lumberjacks must be strong, hardy men to work in that cold biting weather day after day.

A lumber camp in the north woods is a little settlement of log huts huddled together. The largest of the huts is the men's camp, which is one large room with bunks arranged around the walls two or three tiers high. The cook camp is also one large room with a huge range and cook table in one end. Here are long tables, laid with a great array of tin plates, tin dishes and tin cups, and knives and forks of heavy steel with heavy iron handles. Then there are the stables, much like the other shanties but with lower roofs so that the animal heat of the horses and the oxen may help keep them warm. The blacksmith shop is also low roofed, and the storehouse, located alongside the cook camp, is almost buried in the snow, so that the provisions will not be damaged with the cold. A little log hut standing to one side is the office or "van" where the camp clerk keeps the accounts and lists of the general merchandise required. Here are the bunks of the foremen in charge of the work, and here also is a stock of mackinaw jackets, heavy woolen underwear, shoe-packs, mittens, caps, tobacco, pipes, stationery, and other supplies. So you see this is a regular little village in itself, and it needs to be, for usually it is a long journey to the nearest town.

WHERE THE "LUMBERJACKS" LIVE



We are here at the beginning of the long lumber route which leads from the great forests, down trails and rivers, over railways and through mills until it reaches our lumber yards. These lumber camps are rough and ready places, moving from time to time as the timber is cut away.

HAULING LOGS IN MINNESOTA



These men are loading logs on a big sledge. The sledge runs on a road which is flooded daily with water and thus kept coated with ice. The logs are hauled to a nearby river.

Long before daybreak the camp is stirring, and by the time the sun has risen the men have eaten breakfast and are on their way into the woods. They are a motley crew, in the bright mackinaw jackets of varied colors and their yellow and green stag trousers.

A tree has been marked for cutting and notched. This notch is a foot or more deep on the side toward which the tree is to fall and governs the direction of the fall. So accurate are the

FOUR SCENES IN THE LIFE OF A LUMBER LOG



It is in the winter time when the ground is covered with snow that the sturdy lumberjacks do their work and my! what appetites they have after several hours' work sawing down trees like this. All the felled trees have been marked for cutting during the previous autumn by experts, who judge when they are ready to be made into lumber. When it is possible the trees are felled so they lie pointing down hill. This makes it easier to haul them out.



How do these immense logs get to mill? By various routes, and, like human travelers, frequently they have to "change cars." This picture shows one of these means of travel—a wooden runway in which logs are placed and hauled down the declivities by horses. Sometimes the runway is greased, and when snow is heavy the work is easy. The first logs that pass smooth the snow and the rest slide easily, or else the snow becomes ice, which is even better.

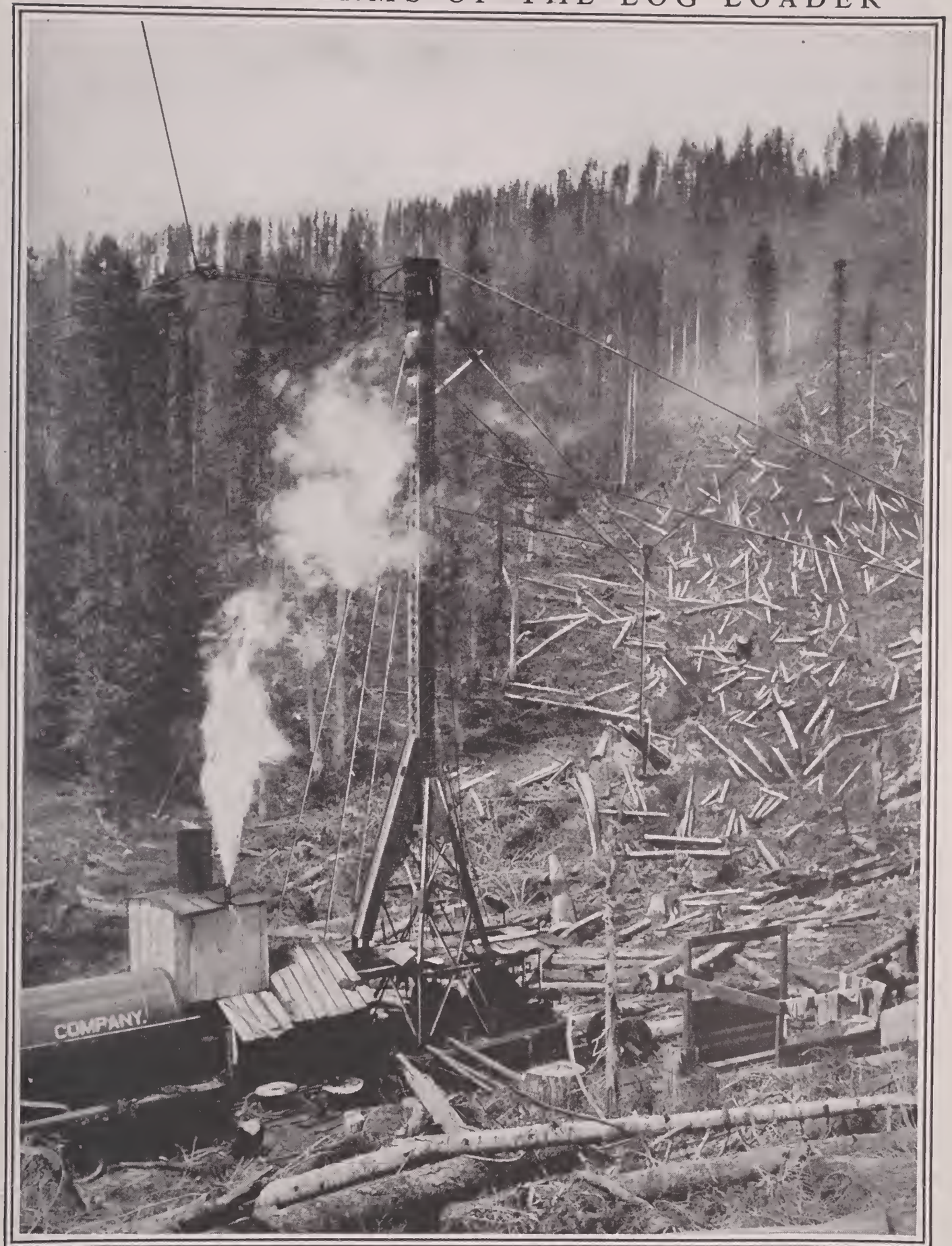


This picture shows a method of loading in the summer time. The logs are hoisted upon motor trucks by the block and tackle arrangement, called a "skidder." This skidder runs on "caterpillar" wheels. The hoisting is done by a steam engine mounted on the platform of the skidder and the logs are guided to their place on the load by two men.



Sometimes a convenient mountain stream is harnessed and made to haul logs out of the woods in the manner shown above. A sluice-way is built and the stream, or a portion of it, is turned into the upper part. Then the logs are dumped in, and rush and bump down the slide with the water until they reach the collecting point.

THE LONG ARMS OF THE LOG LOADER



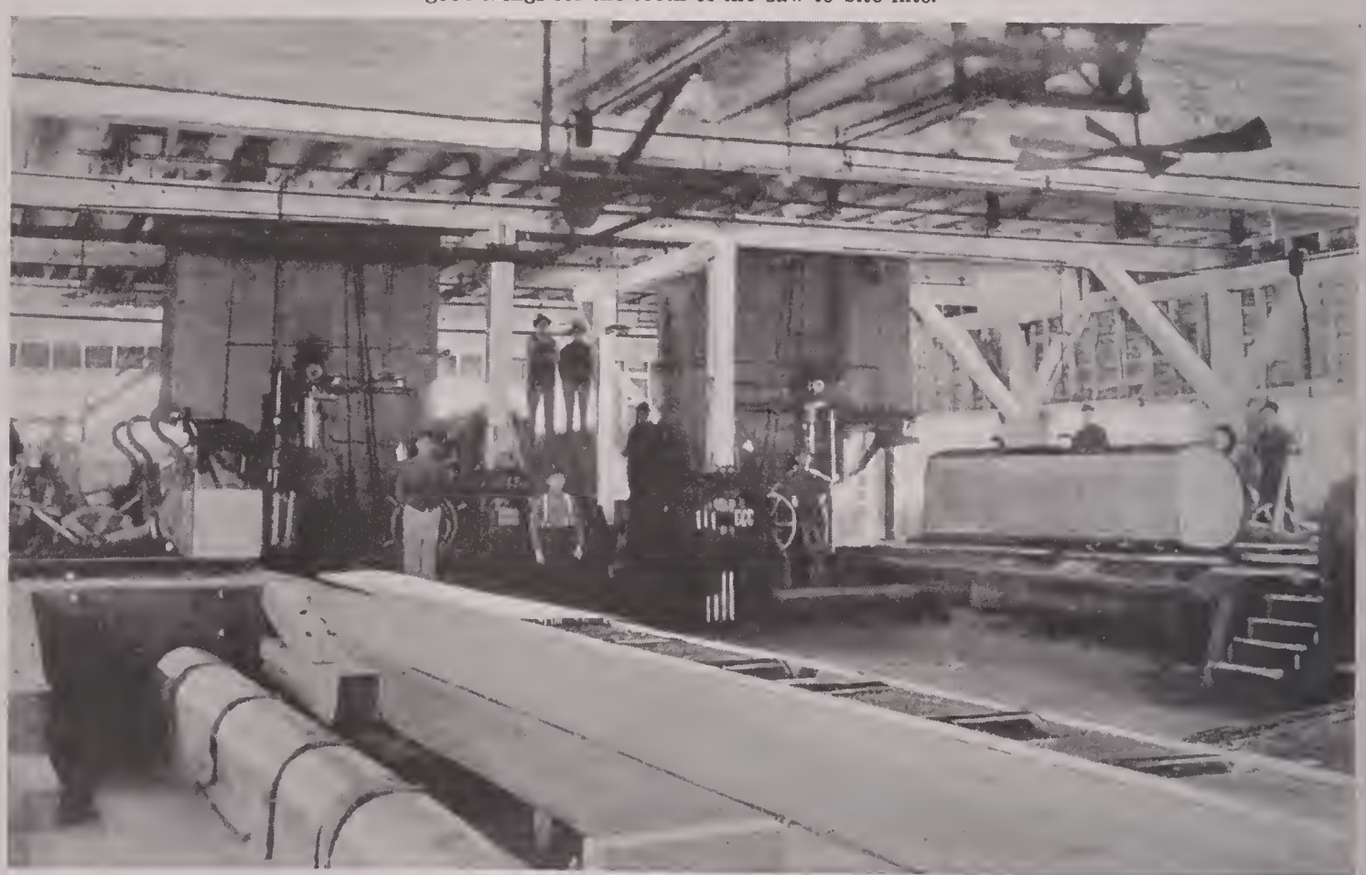
Here is an arrangement that saves climbing all over a mountainside in order to pile the scattered logs. It consists of a simple arrangement of block and tackle. Cables are carried to different points as needed, and the loader runs out along the cable, picks up the logs, and brings them to a central point. From here they are sent on their way to the mill. Thus one "set up" of the derrick and rigging collects logs from the entire mountainside, and when the space is cleared, the whole equipment can easily be moved to another location. The arrangement is one of the many ways in which modern engineering helps in speeding up production in the lumber industry.

contained in the Easy Reference Fact-Index at the end of this work

WHEN THE LOGS GET TO THE MILL



When the logs get to the mill they will climb right up the "moving stairway," just as you see this log doing here. The logs with which the big saws are supplied are kept "in store" in the water at the foot of the runway, and there, with the help of a man with a long pole to guide them, they are taken from the water by an endless chain with cleats. The logs rest against the cleats, and are carried up into the mill. But before the saws are set to work on them, these logs are given a hot bath —that is to say, they are sprayed with hot water. Remember that these logs have been lying on the ground and have been dragged about more or less and the rough bark collects sand, small pebbles, and bits of stone. These wouldn't be good things for the teeth of the saw to bite into.



In the background is a log from which several boards have already been sliced. It rides on a carriage which passes it back and forth against a band-saw, which you can see just beyond its far end. The man at the nearer end uses the lever to control the machinery which turns and shifts the log on the carriage so that the planks will be cut just right. Band-saws are long flexible strips of steel which run over drums, like the belt of a sewing machine. They work better than circular saws.

For any subject not found in its alphabetical place see information

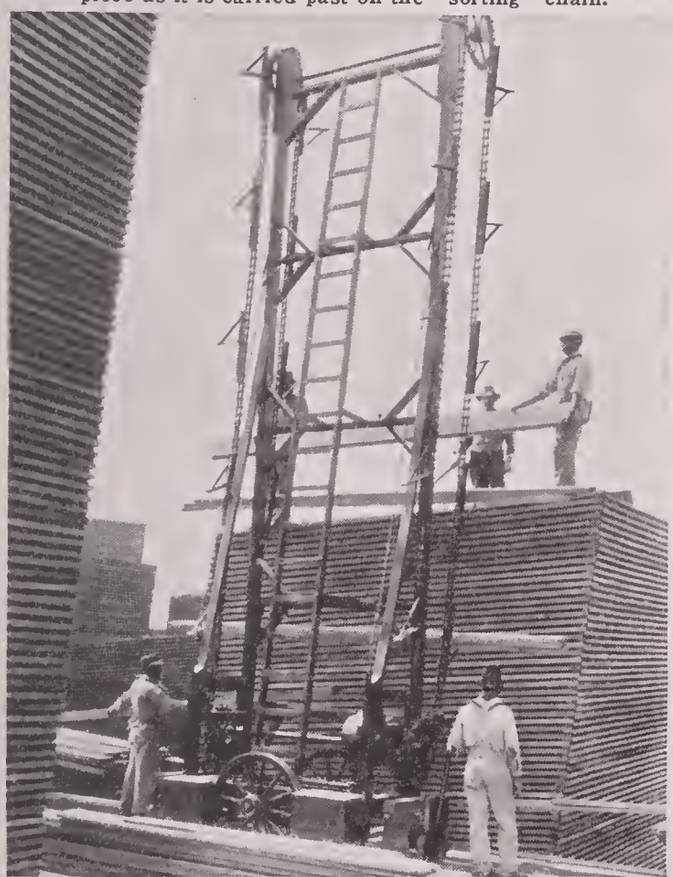
PUTTING ON THE "FINISHING" TOUCHES



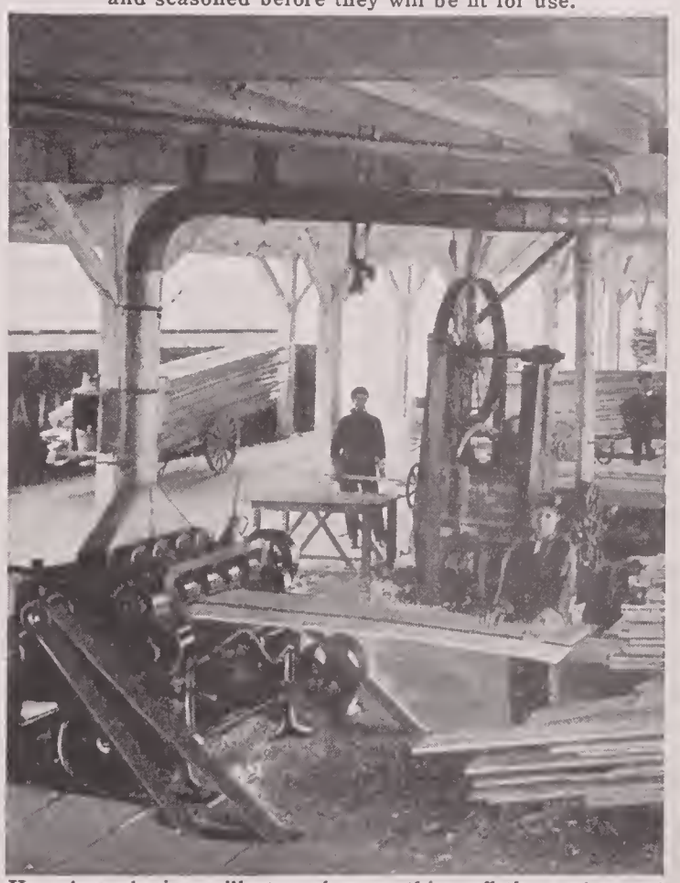
Here is where lumber passes before inspectors to be judged. Lumber is graded according to its strength, durability, and freedom from knots and other blemishes. If it is to be used for interior finishing or for furniture, its beauty of grain is also an important factor. In the mills, experts grade the lumber, keeping in mind these qualities, and they mark each piece as it is carried past on the "sorting" chain.



This curious railway up in the air is called an "overhead monorail"; it carries the lumber out of the mill to be stacked and dried. The trees of course had moisture in them when they were felled, and gathered even more from lying about in the snow and floating down rivers. So they were soaked through when they were sawed, and the planks must be dried and seasoned before they will be fit for use.



After it comes from the mill, lumber is stacked in spaced layers like this, to let the air circulate between the boards. In mill yards this is done to let the original moisture evaporate, and in local yards, so the boards will dry after rain and snows. In big lumber yards machinery helps do the piling.



Here is a planing mill at work, smoothing off the surfaces of the rough planks that come from the saws. This planed lumber is then used for floors and fine work where rough planks would not do. Other machines cut tongues and grooves when desired. Planed lumber is stored under cover.

axmen that they can drive into the ground with the fall of the tree, a stake set 50 feet from its foot. Sometimes the felling is done by sawyers, using a long double-toothed saw, one at each end, on the side of the trunk opposite the notch.

When the tree falls, the branches are cleared off and the trunk is measured and cut into logs. These are then hauled to the road, which was cut and leveled in the autumn. This road is flooded daily with water and allowed to freeze, so that the logs can be easily sledded to a river or stream. Here they rest until spring, when they begin the river journey to the logging town. The men travel with the logs, sometimes along shore, and sometimes riding the rafts or even single logs. They watch the logs closely so that they will not get caught in the rapids or form a "jam" at the bend of the stream. Some of the lumberjacks become very expert in walking on the tumbling icy logs, and in performing other feats of their adventurous calling.

When the logs reach a larger river or great lake, they are sometimes formed into rafts or "booms" and towed by a tug. For a long time the Mississippi River was a great highway for lumber rafts, but of late years logging has practically ceased below St. Paul. Above Minneapolis the river is still used to some extent to float logs bound for local mills. The Ottawa River in Canada is now the most important stream of this picturesque and adventurous type of lumbering.

In most places in the South and West railroads are used to handle the log supply. This railroad consists of a permanent main line and spurs which are projected into the forest and are moved from time to time as the timber is taken out. A steam "skidder," operating on the railroad track, pulls the logs to the railroad line. There they are picked up by a steam loader, which is a crane with a swinging boom, and are loaded on flat cars.

Where the Logs are Changed to Lumber

A great sawmill in operation is one of the most interesting places to visit. The logs, which float in the water within the confines of a "boom" or chain of other logs, are guided to a "log-slip" or runway where a continually moving cable snatches them from the water and after carrying them under a cleansing spray of hot water lands them into the mill. Here they fall upon a carriage which brings them to the saw.

Formerly circular saws—mounted one above and one below for big logs—were used; and it was a fine sight to see the log carriage go racing back and forth like a shuttle while the sawyer moved the levers controlling its course and shifted the log each time with skilled judgment so that it should be sawed to the best advantage. The "zip" of the saws—now high, now low—telling of the progress of the sawing made a music as fascinating as the spectacle, while the odor of fresh sawdust added to the pleasure.

Today circular saws are used in the big mills only for trimming boards and for similar minor operations. The sawing of the logs is done entirely by "band" saws so mounted that each makes a continuous band or ellipse, traveling at a tremendously rapid speed over one wheel above and another below the sawpit. Such saws move at more than 20 times the speed of a "reciprocating" saw, or one which moves up and down in the jig-saw fashion. Often a number of band saws are mounted in "gangs," so that the entire operation of sawing the log into boards is done with one forward movement of the log carriage. Another advantage of the band saws is economy, for they waste much less of the log than is the case with the circular saws.

The Saws that Wear "False Teeth"

An interesting fact in regard to the circular saws of today is that they often have false teeth! It was discovered that no matter how finely the teeth were tempered and how hard the steel was made, the *buzz-zipping* through the hardwood logs tended to break them off. So saw-makers now make the teeth separately and set them in the blade, and when one breaks or wears out a new tooth is easily inserted.

In any well organized sawmill the bark-covered slabs and the trim from the edges of the boards and planks is worked up into laths, shingles, and similar small wares, or sawed into lengths for fire-wood. Even the sawdust is used, for it is burned as fuel in the engine room, or distilled to make wood alcohol.

The product of the sawmill is rough lumber and the operation may stop at that point. But sometimes a planing mill is operated together with the sawmill, and the lumber is cut into smooth-faced boards or shaped into moldings and like products. The lumber as it comes from the saw is green or wet and must be dried before it is shipped to market. This is done either by piling in a yard so that every piece may be air dried, or putting it through a steam kiln.

Lumber is graded according to its strength, durability, and freedom from knots and blemishes. If it is to be used for woodwork or furniture, its beauty of grain is also an important factor; sometimes "hardwoods," such as oak and sycamore, are "quarter sawed" so as to show more of the edge grain.

In the United States the principal kinds of lumber are yellow pine, Douglas fir, and oak. Hemlock and white pine are also valuable woods. Some of the big redwood trees of California are 30 feet thick, and have to be sawed into several logs by enormous saws and then split with dynamite so they can be handled at all. The principal varieties of Canadian lumber are spruce, Douglas fir, and white pine. The great tropical forests of South America produce rosewood, mahogany, and other woods valuable for furniture making and cabinet work. In nearly every country of the world are timber woods so valuable and beautiful that they are got to market at the greatest labor and expense.

The forests which once covered such a large part of our continent have grown smaller and smaller. There were such immense forests that little thought was given to their preservation. Today when an area of 7,000 square miles of forest must be cleared

every year to supply the needs of the United States for board lumber alone, it is easily seen that without scientific regulation and reforestation the forests will soon be gone. (*See* Forests and Forest Protection; Furniture; Trees.)

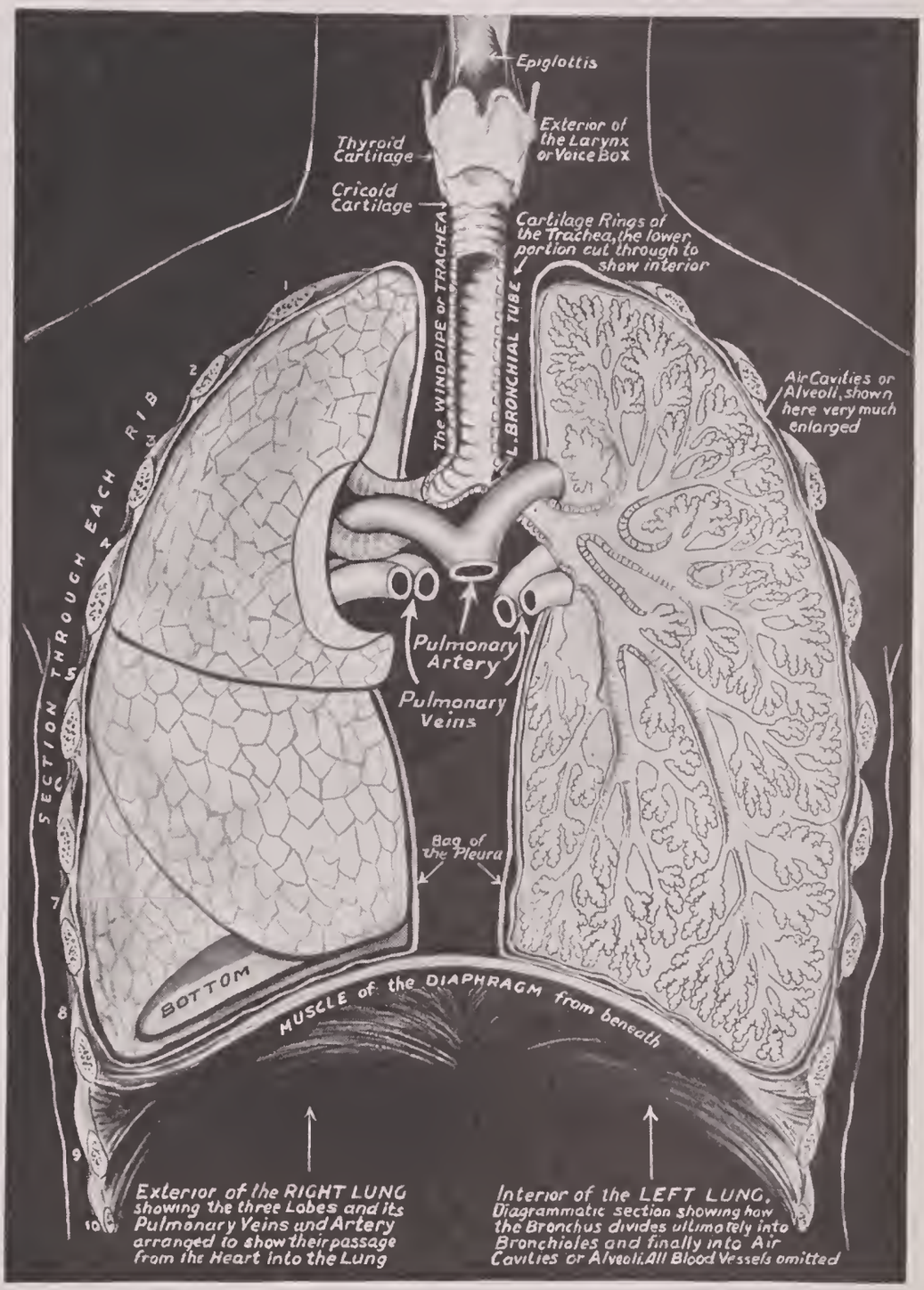
LUNGS. The human lungs are as complicated and their functions as wonderful as those of any other part of man's amazing body. (*See* Blood; Respiration.) The windpipe divides into two main branches —the bronchi. These enter the lungs, and are subdivided again and again into the bronchial tubes, which branch like the twigs of a tree. The smallest divisions enter into air-sacs, which are lobulated and have very thin walls. A network of capillaries is spread over the thin walls of the air-sacs, and it is in these capillaries that the exchanges between air and blood go on. The blood does not anywhere come into contact with the air, but the exchange of gases is made by gas pressure through the thin membranes of the air-sacs and the capillaries.

The substance of the lungs is spongy, and considerable elastic tissue enters into their structure, which allows them to stretch and contract. It is not possible in an illustration to give a true picture of the complexity of the lungs. Not only bronchial tubes branch through their substance, but blood-vessels which carry blood to be aërated, others which carry arterial blood to nourish the lungs, besides lymphatics and nerves, branch through.

The oxygen received by the lungs is carried by the circulation to the minutest parts of the distant tissues, and is there given up in exchange for carbon dioxide. It therefore is clear that there is an *external* respiration taking place in the lungs and also an *internal* respiration taking place in the tissues throughout the body. The latter is the more important part of the process of respiration, in the sense that it is in the living tissues that oxygen is used and carbon dioxide produced.

The air is renewed in the lungs through the action of the diaphragm and muscles of the chest. The lungs themselves are passive sacs but they are filled and emptied like a bellows by the action of the respiratory muscles. In general an adult breathes about 18 times a minute and at each breath inhales 20 to 30 cubic inches. In 24 hours this amounts to about 400 cubic feet of air. From this we absorb 4 or 5 per cent of oxygen, which weighs nearly two pounds, daily. Exercise increases the total amount inhaled.

WHERE WE GET AIR INTO THE BLOOD



Here are the lungs, seen from in front. A small portion of the right lung is cut away to show the air tubes and blood-vessels. The left lung is cut open to show its interior.

WHEN LUTHER BURNED THE POPE'S BULL



This incident marked the most dramatic moment in Luther's break with the church of Rome. It took place in Wittenberg, Saxony, on Dec. 10, 1520. Messengers from the Pope had brought an official proclamation or "bull" condemning Luther's new teachings, and calling upon him to retract under pain of excommunication and other punishments for heresy. Luther, who had learned that messengers were on the way, had called together the students of the University and when the bull was delivered to him he cast it into the flames.

LUTHER, MARTIN (1483–1546). "Here I stand; I can do no other; God help me! Amen!" These are the words which tradition puts into the mouth of the monk Luther in the year 1521, in the memorable scene in the bishop's palace of the quaint old German city of Worms, on the river Rhine, when he was called to account for his religious teachings. Though it is highly probable that he did not use these words, they nevertheless sum up fairly well the spirit of the long and elaborate reply which, after some preliminary hesitation, he made to the assembly.



MARTIN LUTHER

The young emperor Charles V had just come into his German dominions from Spain, and was holding an assembly or "diet" to regulate the affairs of Germany. Among other weighty topics was the question what to do with Luther, professor in the elector of Saxony's University of Wittenberg, whose religious teachings, although formally condemned by the Pope's bull in 1520, still continued to set Germany aflame. Even the Pope's representative, Alexander, who was there to demand that Luther's books be burned and their author sent to Rome for punishment, recognized that there were difficulties. "All Germany is in commotion," he wrote his master. "Nine out of every ten cry 'Luther,' and the tenth, if he does not care for what Luther says, at least cries, 'Death to the court of Rome!'"

When faint-hearted friends had counseled Luther to distrust the emperor's safe-conduct to Worms he had replied, "Though there were as many devils in Worms as there are tiles upon the roofs, I will go there."

The refusal which Luther gave to the demand that he recant his books was followed by the Edict of Worms, issued by the Emperor May 25, 1521. It condemned Luther and called upon all persons to seize him and give him up to a heretic's death; and his books also were to be committed to the flames.

Martin Luther, whose teachings thus convulsed Germany, was born of sturdy peasant stock in the little village of Eisleben, Saxony. His boyhood was spent in poverty, and he sang in the streets for

bread, as was the custom of poor students. Later his hard-working father was able to send him to the University of Erfurt to prepare for the study of law.

But as the result of an inner religious conflict, Luther entered the Augustinian convent of monks at Erfurt in 1505. After three years of strict monastic discipline and theological studies he became a professor in the new University of Wittenberg, and a few years later was in Rome on business for his monastic order. Luther returned from Rome still a loyal son of the church, but already he had begun to form the views which were to separate him from it. These he later summed up in the words, "Justification by faith," or salvation through trust in God's mercy and not through penances and other works of righteousness.

THE CASTLE CHURCH



This is the tower of the church in Wittenberg to which Martin Luther nailed his famous Ninety-five Theses.

Luther's career as a reformer may be said to begin with the tacking of his famous Ninety-five Theses to the door of the castle church in Wittenberg on Oct. 31, 1517. Such disputations as the one contemplated were common in university life, and are met with even today. Luther's theses were an attack on the prevailing system of indulgences, as preached by Tetzel. When published in pamphlet form they attracted much attention, and controversy followed. Cardinal Cajetan was sent as the pope's legate to Luther, but could not induce him to retract his utterances. The disputation at Leipzig with John Eck (1519) merely widened the breach. In his pamphlets, 'Address to the German Nobility' and 'The Babylonian Captivity of the Church', Luther broke completely with the Roman Catholic church; and then burned the Pope's bull condemning his opinions (1520) and a copy of the canon or church law. To the faithful he was now little better than a rebel.

While returning from the Diet of Worms Luther was seized by the connivance of his friend the elector of Saxony and safely hidden in the picturesque old castle of the Wartburg near Eisenach. There he remained in disguise, concealed even from most of his friends, until the emperor's preoccupation with his wars with France over Italy made it comparatively safe for him to return to his work at Wittenberg.

In 1525 Luther married an ex-nun, Katharine Bora. This step emphasized his rejection of monasticism and celibacy for the clergy. The remainder of Luther's life was spent in writing, preaching, and organizing the reformed church in Saxony. His great translation of the Bible into German remains the standard German version, while his numerous hymns—especially *Ein feste Burg ist unser Gott* ('A Mighty Fortress is Our God')—are still in use. He died at Eisleben, the place of his birth, on Feb. 18, 1546, just as the long deferred war to put down his teachings was about to break over Europe (*see* Reformation).

Catholics and Protestants naturally hold directly opposing estimates of Luther and his work. To the latter he stands as a grand and epoch-making reformer. The former regard him as an heretical fanatic, who, instead of working patiently within the church for a reform which, they claim, was accomplished later through the Council of Trent, rashly led a revolt against the true church and needlessly and unwarrantably hindered the progress of Christianity.

LUXEMBURG. If you should talk with a Luxemburger, he would tell you that although the independent grand duchy in which he lives is so tiny that it would go nearly 12 times even into its little next-door neighbor Belgium, it is one of the most efficiently organized countries in the world. In its area of 1,000 square miles there are 330 miles of railway, about 450 miles of telegraph, and 140 postoffices, and it is so well ruled by its Grand Duchess Charlotte and the Chamber of Deputies — 48 of them, elected by direct vote of the cantons — that an army of 250 serves to keep the peace. Indeed for the 50 years before the World War Luxemburg was one of the most peaceful spots in the world in spite of the fact that it is bounded north, east, and south by Germany, on the west by Belgium, and for a short distance on the southwest by France.

The Luxemburger might also boast to you of its industries. There are more than 80 iron mines employing more than 8,000 people, as well as mines of copper, antimony, and lead, and many smelters. More than half the area is arable for cereals, wine, and fruits, and the grazing tracts feed cattle, sheep, goats, and a breed of horses especially in demand for light cavalry uses. The manufactures include woolens, beer, gloves, pottery, paper, and leather.

To the visitor, however, the Grand Duchy of Luxemburg is rather a beautiful bit of countryside, a paradise for the tourist who likes to go tramping. It

is mostly a rugged forested plateau. The northern part, rising to an altitude of about 1,800 feet, forms a wedge of the Ardennes, deeply furrowed with the valleys of little winding rivers that drain into the Moselle. The southern part is a beautiful fertile region, as well as the seat of the iron industry.

The capital, the city of Luxemburg (population 20,000), 117 miles southeast of Brussels, and 42 miles north of Metz, is one of the most picturesque towns in Europe. The upper city is built on a crag 200 feet high, once so strongly fortified with rock galleries that it was known as the northern Gibraltar. The crag rises in sheer precipices on three sides. Its base is washed by two pretty little streams. The upper city is connected with the lower towns by flights of steps, winding streets, and viaducts.

Luxemburg today is just a toy country, one of the buffer states kept by 19th century diplomacy between Germany and France to help keep the peace of Europe. Six hundred years ago it was a country of importance, for from 1347 to 1437 the Luxemburg rulers were also kings of Bohemia and supplied rulers to the Holy Roman Empire—Charles IV (1347–1378), his son Wenzel (deposed as emperor, 1400), and another son, Sigismund (1410–1437), who played a large part at the Council of Constance where John Huss was burned.

At that time Luxemburg included also the present Belgian province of Luxemburg. Since the 15th century Luxemburg has been ruled by Burgundians, Spaniards, Austrians, French, and Dutch. In 1814, the grand duchy was created and given to the king of the Netherlands. In 1839 the greater part of this became a Belgian province. Although in 1867 the grand duchy was declared neutral territory under the guarantee of the European powers, it remained a member of the German customs union down to the time of the World War. The connection with Holland ended in 1890 with the accession of Queen Wilhelmina. In August 1914 Germany marched troops across Luxemburg and further violated the guaranteed neutrality by using it as a military base. Thus Luxemburg had the hardship of supporting an army of occupation and was subjected to the danger of aerial bombardment of German supplies. Population, about 265,000.

LYCUR'GUS. Some 2700 years ago the great lawgiver of Sparta was fleeing for his life before a jeering crowd of his fellow citizens. A rain of stones fell thick about him, but by good hap he outran all his pursuers but one vigorous youth. As Lycurgus turned to look back, the youth thrust at him with a staff, putting out one of his eyes. The great man uttered no word of reproach. Concealing the pain he suffered, he calmly waited for the mob to catch up. When they saw the ill usage that had befallen the greatest man of Sparta, their anger turned to dismay and shame. Repentantly they escorted Lycurgus to his home, and delivered the youth into his hands to punish as he saw fit. Now Lycurgus gave proof of the greatness of his soul, for instead of wreaking vengeance on the youth who had blinded him, he took him into his home to live with him. The young man, thus having an opportunity to observe the life of the man he had so hated, presently became one of his greatest admirers, and was changed from a wild and passionate enemy of the laws of Lycurgus to a sober and discreet citizen.

So runs one of the stories which the Greek historian Plutarch tells us of the mysterious Lycurgus, who lived so long ago that we do not know which of the tales are history and which mere legend. The Spartans of a later day believed that Lycurgus had been the author of all the strange laws and customs which distinguished their state from the other states of Greece, and worshiped him as a god.

Lycurgus, who, they believed, lived about the 9th century B.C., belonged to the royal house of Sparta, and might have claimed the throne. When the king's widow proposed to him that they should destroy the infant heir and reign in his stead, Lycurgus rejected the scheme with abhorrence and proclaimed the child king. Soon after this he set out to travel in foreign lands, conversing with sages and studying the laws of the countries he visited.

When he returned home, after many years, he found Sparta in a state of disorder and discontent. With the help of some of the leading citizens, who believed that an entire change of government was the only remedy, Lycurgus made himself master of the city and drew up a new set of laws, designed so to govern the lives of the citizens as to build up a strong state (*see* Greece; Sparta).

Then obtaining a solemn promise from his fellow citizens that they would obey the laws and change none of them until his return, Lycurgus again departed. Being told by the oracle at Delphi that the Spartans would enjoy everlasting prosperity as long as they did this, he decided never to return, in order that the Spartans might forever remain bound by their promise.

Lycurgus is one of the great lawgivers of antiquity, and ranks with the legendary Manu of India, with Hammurabi of Babylonia, Moses among the Hebrews, and Solon of Athens.

LYNCHING. In the early days of the Great West of the United States, when cattlemen and miners were scattered over a huge wild country where policemen and courts were unknown, there were two famous characters who helped to maintain order—"Colonel Colt" and "Judge Lynch." Colonel Colt was the revolver that every man carried for his protection, and Judge Lynch was the rope that was used surely and swiftly to hang those who broke the written or unwritten law of the frontier.

Lynching, which means the summary punishment of suspected criminals by private individuals and without a regular trial, was almost a necessity in those days, for effective government organization for the punishment of "bad men" had not caught up

with the spread of population. This justification no longer exists. In recent years lynching has been the work of brutal bloodthirsty mobs, who seize the pretext of vengeance for some crime as an excuse for gratifying their savage passions. Negroes have been the chief victims and the southern and middle western states the principal seats for these outbreaks of lawless violence. In many of these states it has proved almost impossible to convict persons who have taken part in these outrages, as public opinion in the communities is often so debased that no juries will find them guilty. The Federal government is powerless to act, because the administration of criminal law is entirely in the hands of the various states. During the World War President Wilson issued a statement earnestly protesting against such outbursts of lawlessness, saying:

"There have been many lynchings, and every one of them has been a blow at the heart of ordered law and humane justice. No man who loves America, no man who really cares for her fame and honor and character, or who is truly loyal to her institutions, can justify mob action while the courts of justice are open and the governments of the states and nation are ready and able to do their duty. I say plainly that every American who takes part in the action of a mob or gives it any sort of countenance is no true man of this great democracy, but its betrayer."

The best remedy for lynch law has been discovered to be prompt action by the courts in serious criminal cases and a speedy execution of the sentences imposed on the guilty.

The word "lynch" is said to come from the name of Charles Lynch, an American planter who during the Revolutionary War illegally inflicted punishments on Tories.

LYNN, MASS. For nearly 300 years Lynn has been a shoe city. Today it holds first place in the manufacture of women's shoes. If the 600 journeymen and 200 master workmen who managed to turn out 300,000 pairs of shoes in the year 1795 should return, they would be amazed to see one factory alone producing shoes at the rate of 14,000 pairs a day. The other products of Lynn include electrical supplies, meters, arc lamps, machinery, foundry and machine shop supplies, boxes, and patent medicines. Lynn was settled in 1629, and chartered as a city in 1850. Shoe-making began in 1636, and as early as 1651 there was a corporation of shoemakers. The city is picturesquely situated on a shallow harbor of Massachusetts Bay, with a three-mile shore line, ten miles northeast of Boston. Population, about 100,000.

THE EYES OF THE LYNX



The lynx, like the owl, looks dull-eyed during the daytime. This is because his eyes have unusually large pupils for night service and he must keep the "blinds" closely drawn in the daytime, to keep the sunlight from paining him.

LYNX. So acute is the sight of the lynx that the ancients believed he could see even through a stone wall. That is why we still speak of sharp sighted people as "lynx-eyed."

This member of the cat family is found in the northern regions of both the New and the Old World. It is smaller than the leopard and larger than the true wildcat, which exists only in Europe. The name wildcat is, however, applied in America to various species of lynx. All have stumpy tails, long limbs, tufted ears, and eyes which contract in the daytime to a narrow slit. They live in forests and rocky places and are fond of resting stretched out on a tree limb in the sun. By night they hunt their food, which consists of birds and small animals. They often kill sheep and chickens.

The sudden cry of a lynx at night is one of the most frightful sounds known to woodsmen. Usually it consists of a single sharp howl, followed by silence. The reason for this is interesting. The creatures on which the animal preys, such as rabbits or quail, seek to escape his notice by lying perfectly still. The lynx, unable to distinguish their exact position, crouches down all ready for a leap, then emits his piercing cry. The timid victim, startled out of its wits by the fearful sound, cannot help jumping convulsively. At that instant, the lynx strikes.

The Canada lynx has heavy gray fur mottled with brown, and great numbers of these pelts are exported from Alaska and Canada. The red or bay lynx, common in many parts of the United States, has yellowish brown fur tinged with red. The bobcat of the southwestern United States looks like the red lynx, though smaller.

Scientific name of Canada lynx, *Lynx canadensis;* red lynx, *Lynx rufus.* Three other forms are found in the United States.



This is a Caracal, a member of the Lynx family. He inhabits portions of Africa and Southern Asia. You would know he was a Lynx by those long tufts on his ears.

TALES THE WOODMAN TOLD

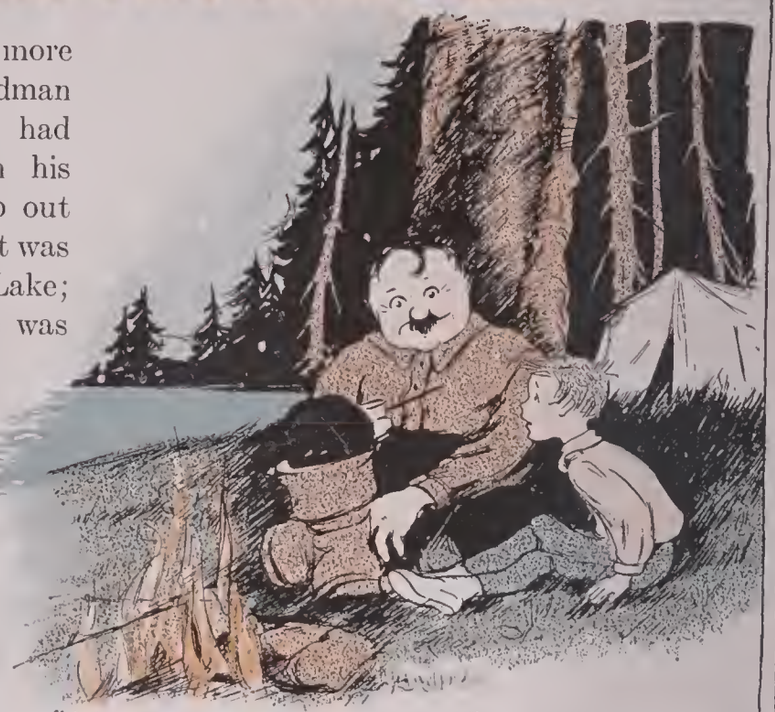
THE STORY OF THE LYNX WITH WINGS

LITTLE BOY had never been more excited in his life. The Woodman Who Was Wondrous Wise had taken him up the river in his canoe, and they were going to camp out all night. It was already dark; the tent was pitched on the shore of Little Fox Lake; supper was over; and a crackling fire was burning under the trees.

Outside the circle of the firelight it was dark, awfully dark, and Little Boy sat mighty close to the big Woodman, for he could hear strange crackling noises back in the woods and queer splashes along the edge of the lake.

"It's just the wind on the water, and the dry wood snapping in the damp air," said the Woodman, smiling his big smile at the little boy's fright.

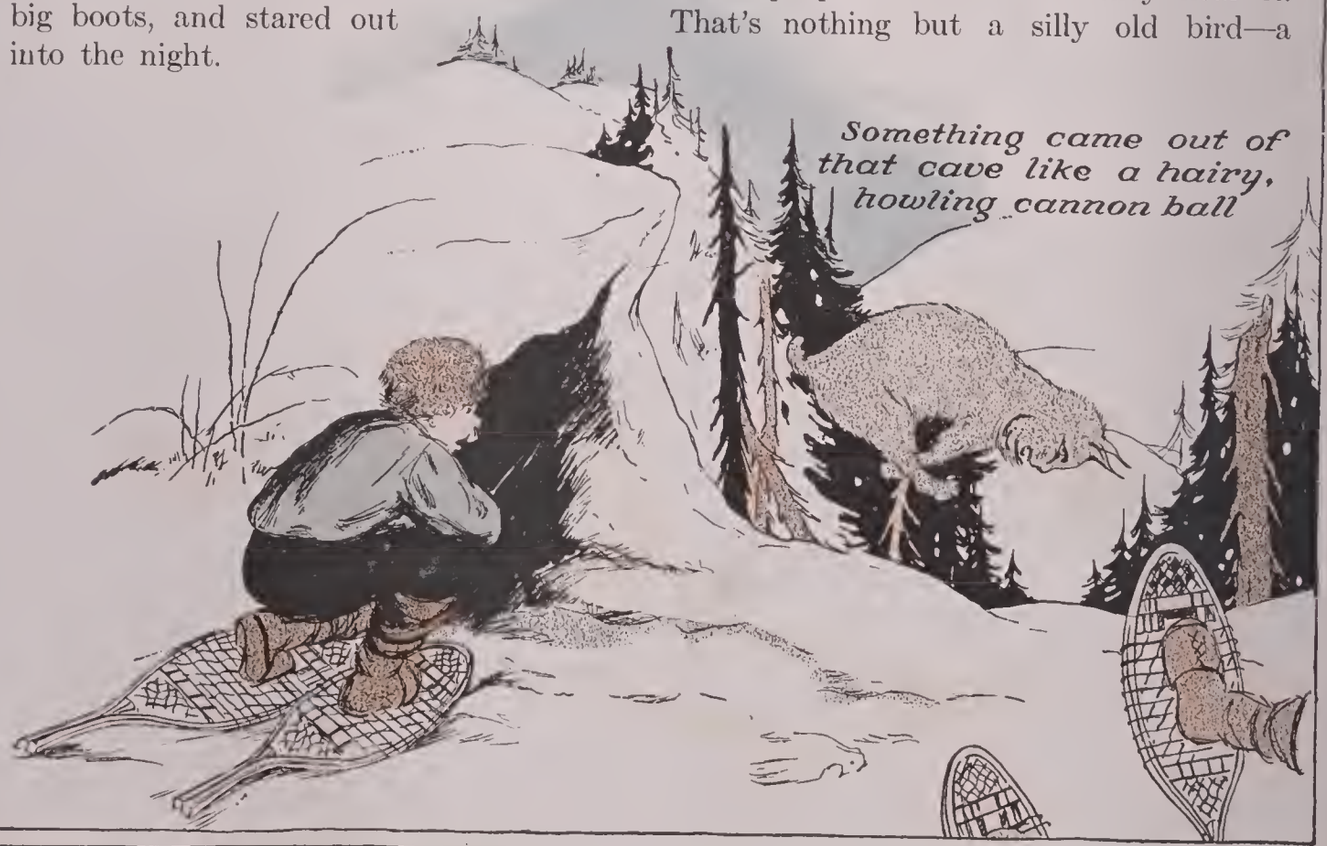
But just then a long weird cry sounded somewhere off in the darkness. It was high-pitched and sharp, with a sort of quaver at the end. Little Boy's hair stood almost straight up on his head. He crawled quickly between the Woodman's big boots, and stared out into the night.



"Was that a---a--l-l-lynx?" he whispered

"Was that a – – a – – l – l – lynx?" he whispered, thinking of the savage-looking creature in his picture book at home.

This time the Woodman chuckled out loud. "It's funny how that noise always scares people the first time they hear it. That's nothing but a silly old bird—a



Something came out of that cave like a hairy, howling cannon ball

laughing loon. That's why they call him a loon, because he laughs that way. No, it's not a lynx, Little Boy. If you ever heard a lynx howl in the dark, you'd never forget about it. I'll tell you about the first time I ever heard a lynx at night.

"It was up in the Big North Woods, years ago. I had a partner my own age, and we were spending the winter looking after a deserted logging camp. One cold day, when the snow was about three feet deep and just like feathers on the ground, we put on our snowshoes and went out to see what we could see. We had a shotgun along and an ax.

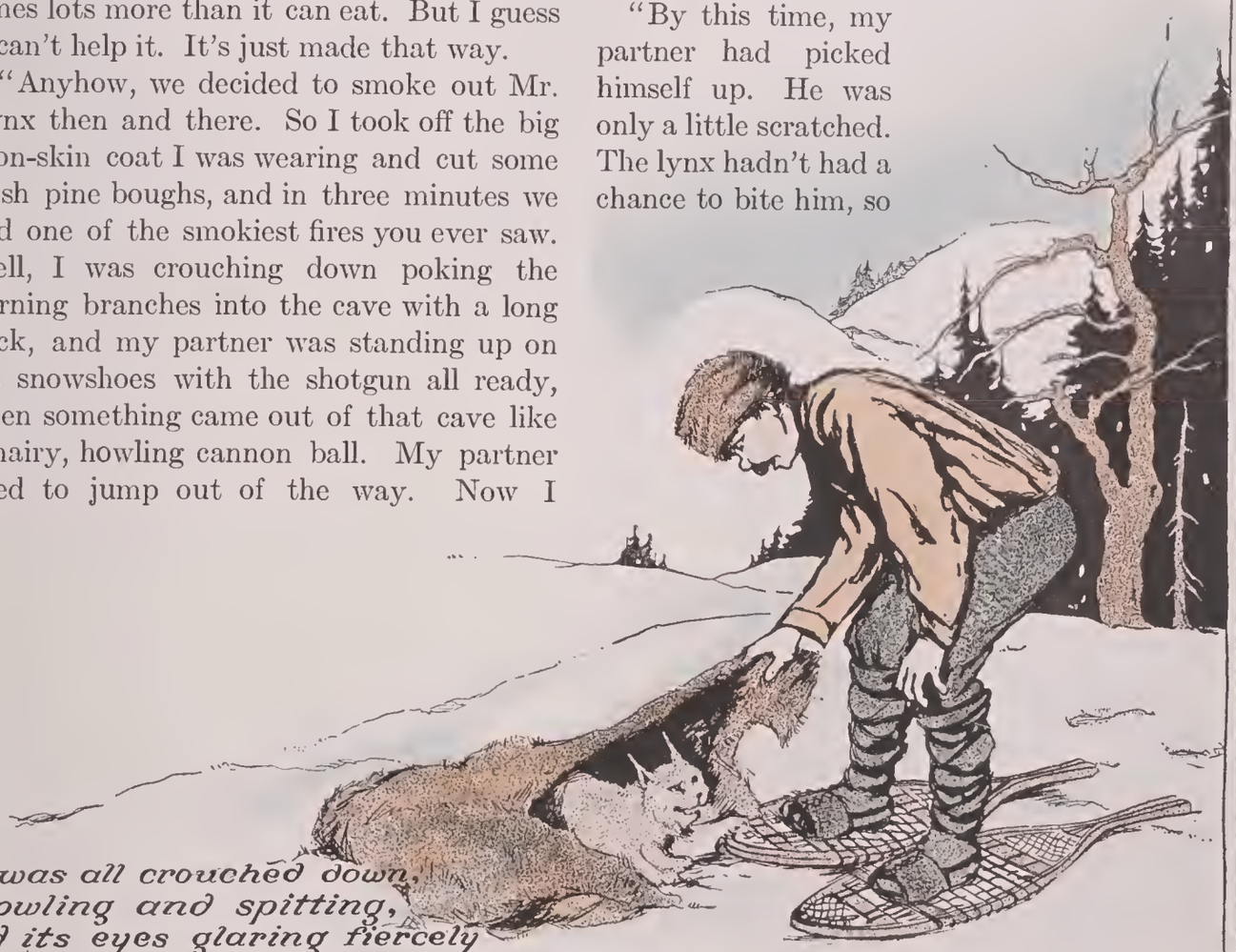
"About three miles from camp we came on a kind of cave in the side of a hill. The snow all around was stirred up, and from the fur and feathers scattered here and there and the half-eaten bodies of rabbits and grouse, we knew it was the den of a lynx. You know, Little Boy, a lynx seems to us a cruel kind of animal, killing sometimes lots more than it can eat. But I guess it can't help it. It's just made that way.

"Anyhow, we decided to smoke out Mr. Lynx then and there. So I took off the big coon-skin coat I was wearing and cut some fresh pine boughs, and in three minutes we had one of the smokiest fires you ever saw. Well, I was crouching down poking the burning branches into the cave with a long stick, and my partner was standing up on his snowshoes with the shotgun all ready, when something came out of that cave like a hairy, howling cannon ball. My partner tried to jump out of the way. Now I warn you, Little Boy, never try to jump when you have on snowshoes! He fell right over backwards, and both barrels of the shotgun went off at the sky.

"He made a big hole in the soft snow, and the lynx tumbled in on top of him. For about two seconds there was the liveliest mixup I ever saw. Both of them were scrambling around together there, each trying to get away from the other, and each howling something dreadful, while I was trying to hit the beast with my stick. But I guess I hit my partner as often as I did the lynx.

"All at once the lynx got on top and jumped out of the hole and streaked away across the hills, bouncing in and out of the snowdrifts like a rubber ball. You know, Little Boy, a lynx has long hind legs like a jackrabbit and is a great leaper. In fact, with its funny short tail and its long pointed ears laid back when it runs, you might almost think it was a giant rabbit.

"By this time, my partner had picked himself up. He was only a little scratched. The lynx hadn't had a chance to bite him, so



It was all crouched down, growling and spitting, and its eyes glaring fiercely

a big bump on his head was the worst of his hurts. I didn't tell him how that happened. I just went over and started to pick up my coat.

"Well, sir, I got the surprise of my life. I took hold of a sleeve and pulled and I felt something heavy inside. And when I pulled a bit more, it began to move around. So I threw back the edge of the coat, and what do you think I saw?—a baby lynx, about as big as a small cat! It was all crouched down, growling and spitting, and its eyes glaring fiercely as if it was going to eat me up. Probably it had run out of the hole after its mother, and dived into the first dark place it could find. We pulled the coat back over it, wrapped it up, and carried it to camp.

"That night in the cabin it wouldn't eat a thing, and the fire frightened it so I put it under a box outside with a big stone on top. I went to bed wondering what people in town would say when I brought back a real live lynx.

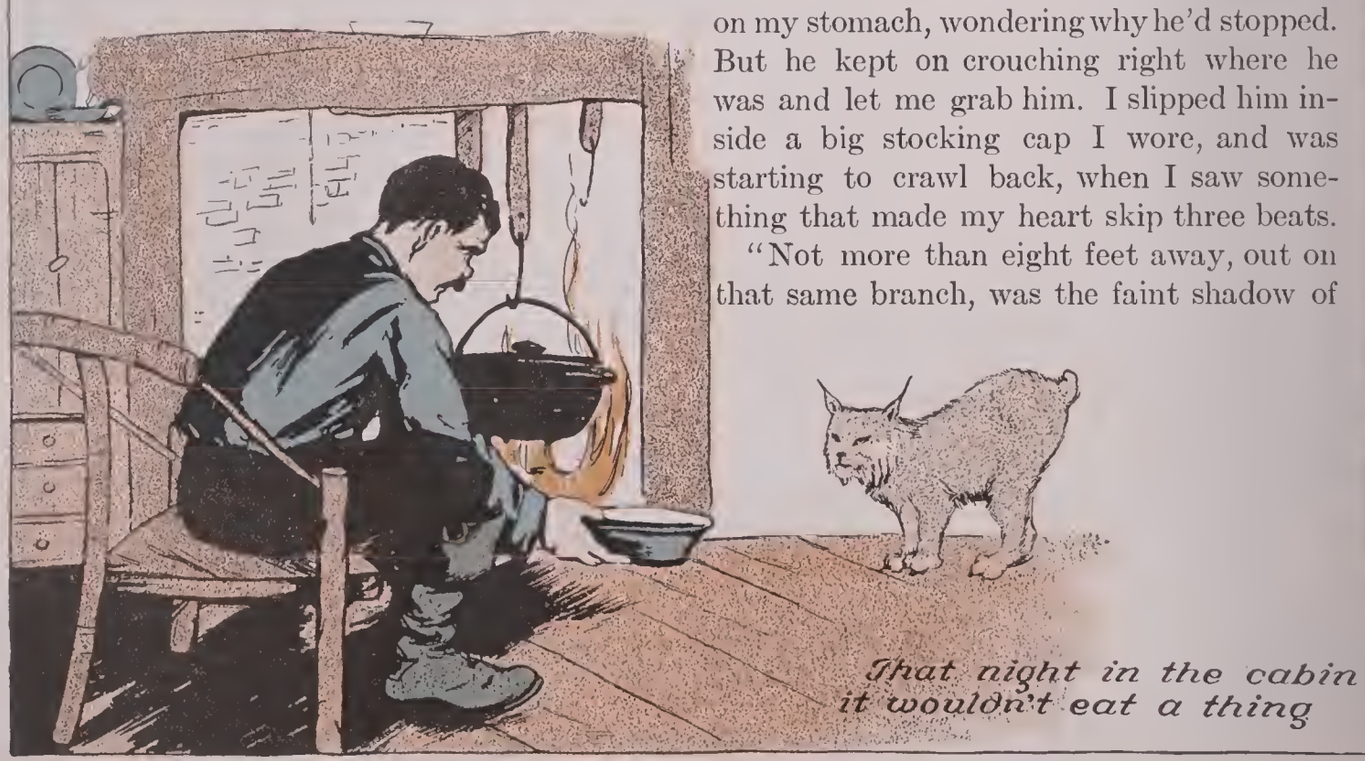
"It must have been about two o'clock in the morning when I woke up suddenly, with a frightful sound ringing in my ears. Just as I was thinking it was only a dream, I heard it again. It was a howl, long and sharp, ending in a wail that sent shivers up and down my back. I poked my partner and he listened, and presently the sound came again.

"'I guess that's only the old mother lynx looking for her kitten', he said, and rolled over and went to sleep again. But I could hear the little lynx scratching around in that box, so I decided to slip on my clothes and go out and fetch him in, for I was mighty afraid he'd get loose, with his mother calling him that way.

"Well sir, I raised the edge of the box and reached in and pulled him out by the back of the neck, just as you'd pick up a cat. But that little savage squirmed around like an eel and sank his teeth in my wrist. Like needles, they were, and I let go with a yell. The next thing I knew, young Mr. Lynx was scooting up a big oak tree, forty feet away.

"It was pretty dark and I was scared, but I wasn't going to lose my new pet if I could help it; so up the tree I went after him. It was an easy climb, and I could tell where the youngster went by his spitting and growling. Finally he got out on a big branch and turned around. His little eyes were shining like green fire. I climbed out on the branch and crawled slowly toward him on my stomach, wondering why he'd stopped. But he kept on crouching right where he was and let me grab him. I slipped him inside a big stocking cap I wore, and was starting to crawl back, when I saw something that made my heart skip three beats.

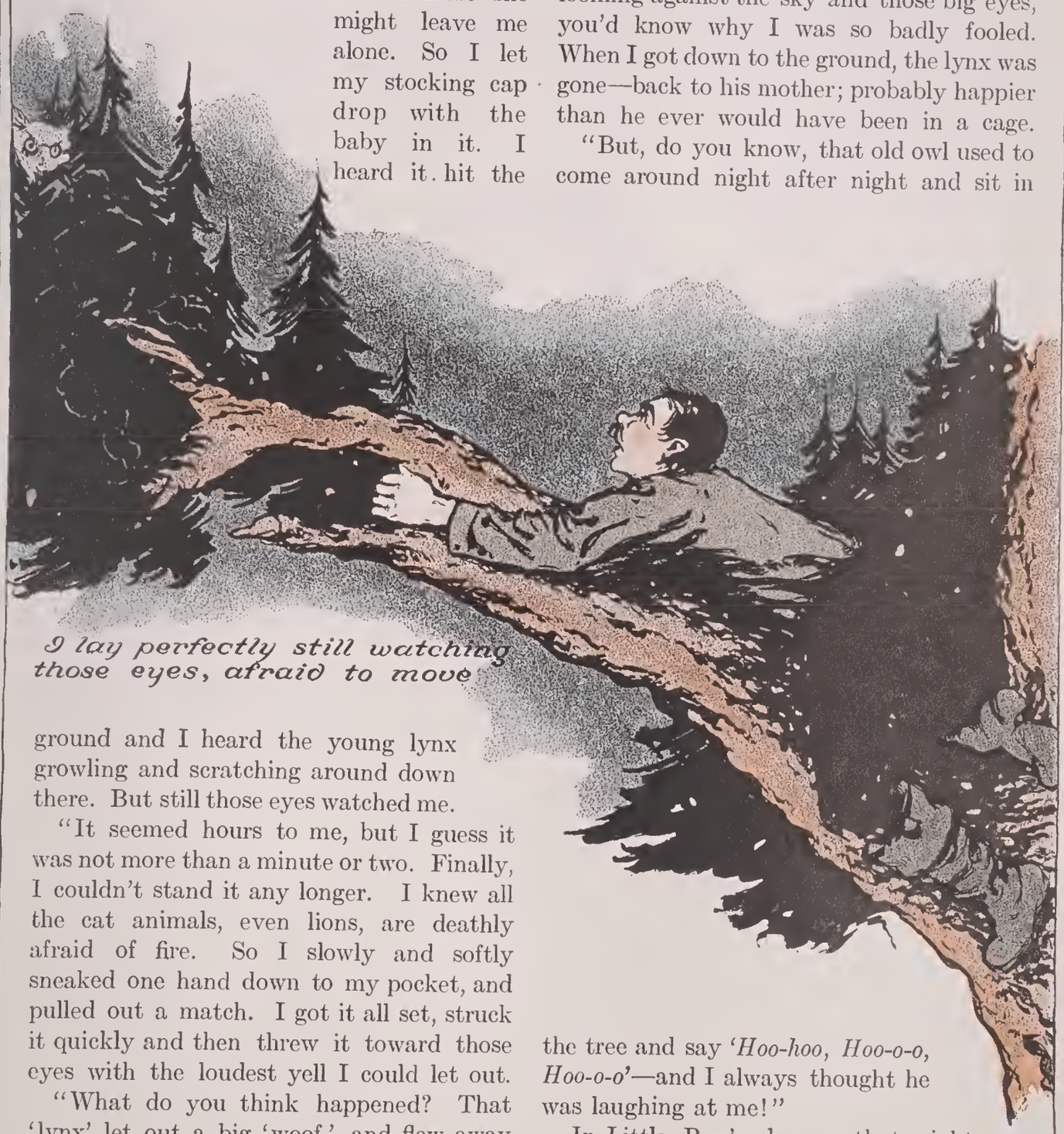
"Not more than eight feet away, out on that same branch, was the faint shadow of



That night in the cabin it wouldn't eat a thing

two big ears against the sky, and between those two ears were two fiery eyes, looking right at me! 'It's the mother!' I said to myself, shaking so I could hardly hang on. There I was out on a limb, twenty feet from the ground, helpless!

"I lay perfectly still watching those eyes, afraid to move for fear she'd jump. Then I thought if I turned her kitten loose she might leave me alone. So I let my stocking cap drop with the baby in it. I heard it hit the ground and I heard the young lynx growling and scratching around down there. But still those eyes watched me.



I lay perfectly still watching those eyes, afraid to move

"It seemed hours to me, but I guess it was not more than a minute or two. Finally, I couldn't stand it any longer. I knew all the cat animals, even lions, are deathly afraid of fire. So I slowly and softly sneaked one hand down to my pocket, and pulled out a match. I got it all set, struck it quickly and then threw it toward those eyes with the loudest yell I could let out.

"What do you think happened? That 'lynx' let out a big 'woof', and flew away right up into the sky!"

Little Boy had been staring at the Woodman with big scared eyes.

"Flew away?" he gasped. "What do you mean, he flew away?"

"Because," said the Woodman, "it wasn't a lynx at all. It was an owl—a big horned owl. If you ever saw a horned owl at night, with those long tufts of feathers looming against the sky and those big eyes, you'd know why I was so badly fooled. When I got down to the ground, the lynx was gone—back to his mother; probably happier than he ever would have been in a cage.

"But, do you know, that old owl used to come around night after night and sit in the tree and say '*Hoo-hoo, Hoo-o-o, Hoo-o-o*'—and I always thought he was laughing at me!"

In Little Boy's dreams that night loons, owls, and lynxes sang a chorus.

Lyons (*lē-ôn'*), France. "Clack-*bang*, clack-*bang*, clack-*bang*" went the shuttles and beams of the great hand loom, and the white-haired French weaver, 80 years old, bent over his work. The silk he wove was a beautiful shimmering pattern of white and silver so intricate that only half a yard a day grew under his skilful hands. The bare room behind him held a tiny hearth for kitchen, an alcove with a high mahogany bed and crucifix, and little else except the great loom with its spidery silk web.

"All my life," said the old man, "I have lived in this room, weaving silk. And my father before me and his father before him lived here, weaving also. Only when there is war do we go out to fight for France. Yet we are not unhappy, for the silk is beautiful and we help with the fashions of the day."

Such a life would not seem very attractive to a modern American, but from the labor of this old man and thousands like him have come the wealth and the beauty of the city of Lyons, the third industrial city in France. The shimmering silks manufactured here and in the villages around about are used all over the world, and the weaving of them keeps 50,000 hand looms and 30,000 power looms humming. The hand looms are used for the richest and most elaborately wrought stuffs.

The city of Lyons (in French, *Lyon*) is itself very old and stately, and is built where two great rivers, the Rhone and the Saone, come together. Part of the city lies on a point of land between the two, and part overhangs the rivers on the high banks that are reached from the center by 24 bridges and bordered by fine quays. There is a great university here where students are taught law, medicine, and science, a school of fine arts where the men are trained who make the designs for the silks, and other schools and colleges. There are also many beautiful old churches and a big municipal library. In 1918 a new bridge was built and named with elaborate ceremony "President Wilson Bridge."

Lyons is one of the most strongly fortified cities in France, having a double ring of forts about it, to which fortunately the World War never reached. The town was founded before Christ by the Romans, and was the starting point of four great highways built by the Emperor Agrippa. Later it was ravaged by the barbarians and abandoned by the empire. In 1312 it became a part of France. Two great church councils were held here and several uprisings took place in the Middle Ages during which the town was badly damaged. But Napoleon rebuilt and improved it and since his day it has been one of the greatest sources of the wealth of France. Population, about 525,000.

Lyre-bird. The bird whose tail has "made him famous" is the lyre-bird of Australia. Without the 16 long and curiously shaped tail feathers of the male, this bird is not at all unusual, for both male and female are of unattractive form, about the size of a grouse, and of a sooty-brown color with a few markings of red. These tail feathers are about two feet long, generally drooping like a peacock's train, but when raised and spread they take the shape of the Apollo's lyre. The tail does not reach perfection until the birds are three or four years old. It is shed in the fall and renewed each spring. The male bird is very proud of his fine feathers and one of his curious habits is that of scratching together little mounds of soil and leaves upon which he stands, spreading his tail, drooping his wings, and calling to his mate to admire him (for illustration in colors *see* Paradise Birds).

The lyre-bird is the largest of the singing birds. He has a mellow liquid note, and is said to imitate the song of other birds and even animals. The nest is placed on the ground, at the foot of a tree or rock, and is closely woven of fine strong roots and lined with feathers. About this nest is heaped an oven-shaped mass of sticks, moss, and leaves, with a side entrance so that the inner nest and the one egg are entirely protected. The birds are very shy, and when molested escape by running rapidly in the underbrush. They are found at times in the trees, but they are not good flyers. Scientific name of the best known species, *Menura superba*.

MACARONI. Cooked with cheese or served with tomato sauce, this national dish of Italy deserves the widespread popularity it has acquired as a nutritious and palatable food. For macaroni is made from certain varieties of wheat which are very rich in gluten and other nitrogenous compounds. The *durum* wheat, from which most of it is made, is grown chiefly in southern Europe and in the United States.

The coarsely ground flour, mixed with hot water, is kneaded to a stiff paste, which is molded into various forms: hollow sticks or pipes (spaghetti and macaroni); into fine threads (vermicelli), and into small stars, disks, alphabet letters, etc., for use in soups. The dough is put into a cylindrical vessel having a perforated bottom, and a heavy iron plate, driven by a powerful press, forces the paste through in the desired shapes. The long strings of paste are then looped up over rods to dry. For the letters and other "pastes" a shearing arrangement slices off the dough in thin little pieces as it is forced through the molds.



MACAULAY
Historian and Statesman

The next time you open a package of macaroni or spaghetti see if the flattened mark of the rod is at the curve. If so, it is the true macaroni, made from flour rich in gluten; for that made from other flours will not bear its own weight, and must be laid out flat to be dried. True macaroni is hard and elastic, has a soft yellowish color, and is rough in texture. In boiling it swells until it is double its original size without becoming pasty and sticky.

MACAULAY, THOMAS BABINGTON (1800–1859). In Trevelyan's 'Life and Letters of Lord Macaulay' is found the following letter to his little niece Margaret:

Sept. 15th, 1842

MY DEAR BABA:

Thank you very much for your very pretty letter. I am always glad to make my little girl happy and nothing pleases me so much as to see that she likes books. For when she is as old as I am, she will find that they are better than all the tarts, and cakes, and toys, and plays, and sights in the world. If anybody would make me the greatest king that ever lived, with palaces, and gardens, and fine dinners, and wine, and coaches, and beautiful clothes, and hundreds of servants, on condition that I would not read books, I would not be a king. I would rather be a poor man in a garret with plenty of books, than a king who did not love reading.

Macaulay's letter spoke the absolute truth about himself. As a child of three, books had been his constant companions. At four he replied to a lady who inquired how he felt after some hot coffee had been spilled on his legs, "Thank you, madam, the agony is abated." He was a brilliant student at Cambridge University in every subject except mathematics. He learned to read books in Greek, Latin, French, German, Spanish, Italian, and Dutch. He read early and late, in bed and out of doors. Indeed Trevelyan says that "the only exercise in which he can be said to have excelled was that of threading crowded streets with his eyes fixed upon a book." No wonder that his friend Sydney Smith once remarked that he was "like a book in breeches."

Macaulay's wide knowledge and his marvelous memory made him a very interesting speaker, for he never ran out of material and he was always sure of his facts. Lord Melbourne, one of his colleagues in Parliament, said of him, "I wish I were as cocksure of anything as Macaulay is of everything." The remark contains a sting, for Macaulay was never bothered by doubts and never speculated on the unknown. Everything stood out in the blazing light of day for him and there were no half-lights. He read books of all kinds, good and bad, for he knew how, as his biographer says, to weave "a purple patch from some third-rate sermon or political treatise" into his inspiring talks or essays.

Macaulay's father, Zachary Macaulay, was a well known reformer whose lifelong opposition to African slavery wrecked the family fortunes. His son studied law and was admitted to the bar but soon turned aside to follow the career of literature. In August 1825 appeared his essay on Milton, the first of a series which for 20 years made him and the *Edinburgh Review* famous. The world of fashion and of letters now learned that this young man could write as brilliantly as he talked.

Macaulay's gifts as a writer and speaker led him naturally into public life. In Parliament, and later in India, as legal adviser to the supreme council, he showed gifts of mind that always held men's attention. In politics he was a Whig, striving for a wider

voting franchise and far-reaching liberal reforms. He was pleased, however, with material progress of the time and closed his eyes to what he considered necessary economic evils.

But during all the busy years of his official life, when writing was just an occasional pleasure and source of income, Macaulay was planning a history of England to begin with the accession of James II to the throne—a history, as he said, interesting enough "to supersede the last fashionable novel upon the dressing-tables of young ladies." He began it in earnest in 1841 and in 1849 finished the first two volumes. Later volumes appeared from time to time, but the work was still uncompleted when Macaulay died, just ten years later.

History as Fascinating as Fiction

Macaulay's history had an immediate success, greater, perhaps, than that achieved by any other history. It had a tremendous sale in England and the United States, and was translated into all modern languages. Macaulay had worked at it with ungrudging toil. He wrote in his diary at one time: "This is a tough chapter. . . What trouble these few pages cost me! The great object is that they may read as if they had been spoken off and seem to flow as easily as table talk." His paragraphs accomplish just what he intended. They sweep the reader along.

For a generation Macaulay was read with enthusiasm and respect. In the generation that followed, his fame was not quite so great. His brilliance, his power of painting a picture, of narrating an incident, still is unsurpassed; but his insight into the complex character of men and of movements left something to be desired. He saw men's outward actions but he could not divine their inner motives. But he saw history as a great pageant, a series of pictures in which the doings of the people great and small appear for the first time along with the chroniclings of court, camp, and Parliament. What Scott did with the romantic novel, Macaulay did with narrative history. He made it interesting, first of all, to the average man and woman, and he set a new fashion. So highly was his work appreciated that a body of English workmen wrote to thank him for writing a history which they could understand.

The Stirring 'Lays of Ancient Rome'

Equally popular with Macaulay's essays and his history was a little volume of poems entitled 'Lays of Ancient Rome'. These still delight old and young, not merely as an exercise in the reconstruction of historic materials, but because of their stirring melody.

In 1857 Macaulay was made a peer with the title Baron Macaulay. He lived to enjoy this new honor only two years. When he died, at the end of 1859, the greatest honor that England can show to her illustrious dead was conferred upon him, for he was buried in Westminster Abbey.

His principal books are: 'Critical and Historical Essays' (4 vols.); 'History of England' (5 vols.). 'The Life and Letters of Lord Macaulay' by his nephew, George Otto Trevelyan, is an excellent biography.

MACAW. A variety of South American parrots distinguished by their brilliant plumage, long wedge-shaped tail, long and pointed wings, naked cheeks, and short highly arched bill. They are easily domesticated, but do not readily learn to talk and persist in violent screaming. There are a large number of species, of which the red and blue macaw (*Ara macao*) and the blue and yellow macaw (*Ara ararauna*) are among the handsomest. (*See* Parrots, Macaws, and Cockatoos.)

MACBETH. This hero of Shakespeare's powerful tragedy of that name is in command of the armies of Scotland, when the play opens, and has just won a great victory over the Danes. The triumph so fires his ambition that witches, bent on evil, easily implant in his mind the thought that he shall be king. Lady Macbeth still further incites him, until with his own hands he murders the Scottish king and usurps the throne. From that moment great Macbeth goes swiftly to his doom. Ghosts rise to haunt him, Lady Macbeth dies insane, civil war breaks out, and finally he himself falls in mortal combat with Malcolm, son and heir of the murdered king. Macbeth is to be abhorred for his crimes, but in all that he does and says he excites a tragic pity, as when, informed of the death of the queen, he thus gives utterance to his gloomy thoughts:

> Tomorrow, and tomorrow, and tomorrow,
> Creeps in this petty pace from day to day,
> To the last syllable of recorded time;
> And all our yesterdays have lighted fools
> The way to dusty death. Out, out, brief candle!
> Life's but a walking shadow, a poor player
> That struts and frets his hour upon the stage
> And then is heard no more: it is a tale
> Told by an idiot, full of sound and fury,
> Signifying nothing.

The story of the play is taken from history, the real Macbeth having ruled over Scotland from the year 1040 to 1057.

McCLELLAN, GEORGE BRINTON (1826–1885). General Robert E. Lee of the Confederate army once said that General McClellan was the best general ever arrayed in arms against him; and yet, after less than six months' command of a large force in the field, McClellan was removed as a failure. We naturally ask the question, "Why, with all his ability, did McClellan not succeed?"

He had good training. In 1846 he had graduated from West Point, and in the Mexican War he had proved so good a soldier that he had been appointed captain. In 1855 the United States government had sent him to Europe to study the war in the Crimea, the greatest of European struggles between the fall of Napoleon and the outbreak of the American Civil War. At the beginning of the War of Secession, in May 1861, President Lincoln had appointed him major-general in the United States army. Immediately he had been sent into West Virginia, where he had rendered valuable assistance to the loyal Unionists, who were seceding from their mother state. On account of this signal success he was hailed as "the

Little Napoleon," and was called to Washington to reorganize the Army of the Potomac after its disastrous defeat at Bull Run.

His aptitude for this work was soon apparent. In a short time order and system appeared where chaos and confusion had reigned. He was a wonderful organizer and a hard worker. He won the devotion of his army, and became the idol of the hour. In November 1861 President Lincoln appointed him commander of the United States army.

Good Organizer; Poor Fighter

But now the fault appeared which was to overshadow all his excellent qualities. McClellan was a good organizer but a poor fighter. He had built up a wonderful military machine, but he hesitated to use it. Summer and winter passed, and still he made no move against the enemy. The patience of the administration and of the people was sorely tried. Finally in April 1862, under direct orders from President Lincoln, he entered upon his disastrous peninsular campaign, between the York and James rivers of Virginia. He advanced within a few miles of Richmond, but after a terrible week of fighting, known as the "Seven Days' battles" (June 25 to July 1), he was driven back and was directed to abandon the peninsula. Union losses in the week's battles were 15,849; Confederate, 19,749. A large part of his army was ordered to reinforce General Pope's troops, and the order was reluctantly obeyed. Pope's disastrous defeat in the second battle of Bull Run gave McClellan a new chance to retrieve his fame. Again in supreme command of the Army of the Potomac, he met Lee at Antietam, Md., where there occurred one of the bloodiest battles of the war (Sept. 16–17, 1862). Lee was forced to withdraw from Maryland, but McClellan showed the same fault which before had kept him from success. Instead of making use of the advantage which he had gained, he allowed Lee to recross the Potomac unmolested. Although he followed Lee into Virginia, his movements were again so slow that in November he was relieved of his command, and General A. E. Burnside was appointed in his place.

This action of Lincoln's caused much bitter criticism, for McClellan still had many devoted admirers. In the election of 1864 all who were dissatisfied with Lincoln's conduct of the war supported McClellan as candidate for president on the Democratic ticket and on a peace platform. But he carried only three states—New Jersey, Kentucky, and Delaware—while 22 states gave their votes to Lincoln. McClellan had resigned his commission in the army before the election took place. The rest of his life was spent in following his profession of engineering, except for a brief term (1878–81), when he was governor of the state of New Jersey.

McCORMICK, CYRUS H. (1809–1884). American harvesting machines are found in all parts of the world where grain is grown. You see them drawn by camels in Mongolia, by elephants in India, by strange humped oxen in Africa, by water buffaloes in the far-away Philippines. And if you should trace the history of these machines you would soon come upon the name of Cyrus H. McCormick. For he it was who in 1831 invented the first reaper—a machine that was the forerunner of the scores of modern reaping and harvesting machines which have enormously increased and cheapened the world's supply of bread by making it possible to harvest grain on millions of acres of land that had never before been under cultivation.

Born on a farm at Walnut Grove, in what is now West Virginia, McCormick grew up under hard conditions. His home was a log cabin that sheltered a family of nine, and the farm was poor rough land that barely afforded a living. But McCormick's father—a man of stern Scotch Covenanter stock—was a backwoods genius in mechanics, who himself invented a rude hemp-brake and clover-huller, and was experimenting on a reaper when Cyrus was born. Father and son became inseparable, and built many a queer contrivance that made them objects of ridicule by its failing to work. But finally, in the autumn of 1831, the farm-boy clattered out of the barnyard on his first reaper, and it actually worked.

A Long Fight toward Success

McCormick started manufacturing the reaper, but it was ten years before anyone could be induced to buy one. Forty miles from a blacksmith shop and 60 from a railroad or canal, he built a blast-furnace on the farm, dug ore out of the Alleghenies and smelted iron himself. In five years he made and sold fewer than 100 reapers. The chief feature of the machine was the long sickle-bar which cut the stalks near the ground by the rapid back-and-forth motion of its saw-edged teeth.

At 37, with only a few dollars, he left the farm on horseback and rode from state to state preaching his reaper. In Chicago he was able to sell a half interest in his invention. Thereafter success attended him. Progressive farmers rushed to buy reapers faster than the Chicago factory could make them.

Exhibited in 1851 at the exposition in Crystal Palace, London, the new American reaper won instant recognition. When the Civil War broke out, the 50,000 reapers in the field released thousands of men for duty at the front. The world saw the United States support two armies in the field and still send grain abroad.

By 1875 McCormick had amassed a great fortune and his factories were turning out not only reapers but many other labor-saving farm devices. As years went on and the gasoline-driven farm tractors came into use, huge threshing machines, gang plows, self-binders, etc., were devised to harvest the crops in the great wheat fields of the West, thus giving the world a granary that hand labor could not have worked.

The inventor died in 1884, having founded the largest establishment in the world devoted to the manufacture of farm machinery.

The FIRST PREMIER *of the* CANADIAN DOMINION

The Scotch Immigrant Boy Who Grew into a Far-Seeing Leader—How He Helped Shape Tremendous Events in Canada's Early Days—A Man Who Got Results while Others Talked

MACDONALD, SIR JOHN ALEXANDER (1815–1891). For nearly half a century the history of the Right Hon. Sir John A. Macdonald is the history of Canada. Under his leadership four of the most significant events of that half-century were accomplished—the federation of the separate provinces into the Dominion, stretching from ocean to ocean and occupying half the area of North America; the acquisition of the vast Canadian Northwest from the Hudson's Bay Company; the building of the Intercolonial and Canadian Pacific railways to unite this far-flung domain; and the adoption of a protective tariff policy, which started the Dominion on its path of industrial prosperity.



SIR JOHN MACDONALD
Builder of Canada

For 19 years of the 25 that elapsed between the federation of Canada and his death, Macdonald was premier of the Dominion—from 1867 to 1873, and again from 1878 to 1891. Other men of his generation excelled him in powers of oratory, in breadth of vision, and in knowledge, but none had a more intense patriotism and none equaled him in genius for leadership. Other men originated policies; Macdonald was the man who put them into effect. He had an almost uncanny power for inspiring his followers with devotion. His wit, his striking appearance, his genial personality, his passionate love of his country, even his very frailties, endeared him to the people beyond any of his contemporaries. Wherever he went, in his distinctive dress—gray frock coat and trousers, gray top-hat, and red necktie—he was followed by a crowd who affectionately hailed him as "John A."

The man who thus became the most conspicuous figure of his times came to Canada at the age of 5, a poor Scotch immigrant boy. Poverty ended his schooling at 15, but his insatiable curiosity and love of reading soon made up to a large degree for the lack of formal education. Entering a law office he was admitted to the bar at 21, and eight years later was elected to the Canadian Assembly. Almost at once he became one of the leaders of the Conservative party, winning a cabinet position within three years.

By 1864 the union of Upper Canada (Ontario) and Lower Canada (Quebec), formed in 1841, was fast drifting into chaos because of party warfare and racial and religious jealousies. Macdonald's political tact made him the leader in the momentous negotiations which resulted in the establishment of the Dominion of Canada in 1867. He too was largely responsible for the adoption of the principle of centralization—the chief point of difference between the Canadian federation and the federation of the United States—whereby all powers not specially conferred on the provinces are reserved to the central government.

For his share in the great achievement of federation Macdonald received two signal honors—he became the first premier of the new Dominion, and he was raised to knighthood (K.C.B.) by Queen Victoria. In 1870 he was one of the British commissioners sent to Washington to settle the *Alabama* claims and the fisheries dispute. He was forced to resign office in 1873, when it became known that he had accepted party campaign contributions from one of the projectors of the Canadian Pacific Railroad. Personally Macdonald was above suspicion of corruption; he lived and died a poor man. But in the pursuit of his great purposes for Canada he sometimes stooped to use unworthy men and doubtful methods.

Less than five years later Macdonald was back at the helm again, where he remained until his death. The story of his other accomplishments—canal and railroad construction, the conquest of sectional jealousies, and many other steps in the course that made Canada a nation—is too long to be told here, and must be read in the history of Canada.

Statues of this great statesman stand in most Canadian cities. In the words of one of his biographers, "the man who welded the northern half of the North American continent into a united whole, who held it true to its British relationship while retaining an individuality all its own, will always live in the grateful memory not only of his own Canadian people, but of the British race."

MACEDONIA. Scarcely a relic is left today of the days of Macedonia's greatness, when under Philip of Macedon in the 4th century B.C. it suddenly shot up to the mastery of Greece. Only a few fragments of masonry remain to indicate the site of its capital, Pella, whence Philip's son Alexander, set out to conquer half the world (*see* Alexander the Great).

As a definite territorial and political unit there is today no such place as Macedonia. It is only the name given to that little region of the rugged Balkan peninsula where Greece, Bulgaria, and the Jugo-Slav Republic meet. Yet small as it is, with a population of only between 2,000,000 and 3,000,000, this district has been for a generation one of the chief storm-centers and war breeders of the world.

Here dwell such a medley of races as can be found in few places in the world. Turks, Slavs, Greeks, Bulgars, Jews, Albanians, Gipsies, Vlachs, and Circassians live in mutual hatred, speaking a dozen tongues and practicing seven hostile religions. During the closing years of the 19th century and the opening years of the 20th, the history of Macedonia was a series of intrigues by the more powerful races, each striving to gain the upper hand and to dominate the region when it should shake off the merciless hand of the Turk, who had held it since the 15th century. Frequent uprisings were followed by savage massacres, until finally the whole seething Balkan question boiled over into the wars of 1912–13, which were waged largely for the possession of Macedonia and the outlet to the sea it affords (*see* Balkan Peninsula).

Following the World War of 1914–18 Greece was confirmed in the possession of the greater part of Macedonia, including the important seaport of Saloniki (*see* Saloniki). Jugo-Slavia obtained the northwestern portion, including the next largest city, Monastir.

During the World War Macedonia was the scene of much hard fighting. Saloniki was the base from which the Allies inflicted a crushing blow on the Germans, Austrians, and Bulgarians in 1918, driving them back many miles on a front extending from the Aegean to the Adriatic and forcing Bulgaria to sue for peace.

GUNS *that* FIRE 600 SHOTS *a* MINUTE

The Little Tubes that Spit Streams of Bullets—How They Have Transformed Modern Warfare—The Ingenious Inventors who Perfected These Deadly Weapons

MACHINE GUN. The great importance which the machine gun now has is the creation of the World War of 1914–18. As late as 1912 the plans of the United States army, as approved by Congress, provided only four machine guns for each regiment, but by 1919 the number had been increased to 336.

There are a number of different types of machine guns in use in the armies of the world today, but all may be classified according to certain features. Some are light one-man guns, fired from the shoulder, and are more properly styled "automatic rifles." Others are heavy guns, mounted on a low tripod or a light carriage and requiring two or more men to operate them. In some the cartridges are fed from a belt, in others from a disk or other magazine. The heavy guns are usually water-cooled, while the light are air-cooled. The older machine guns were fired by turning a crank by hand, but the newer models are automatic or semi-automatic. The automatic types in turn divide into those in which the gun is operated by the recoil of shot and those in which the gun is worked by waste gases of the explosion. The Lewis gun described in the accompanying article is a light air-cooled gun of the latter type.

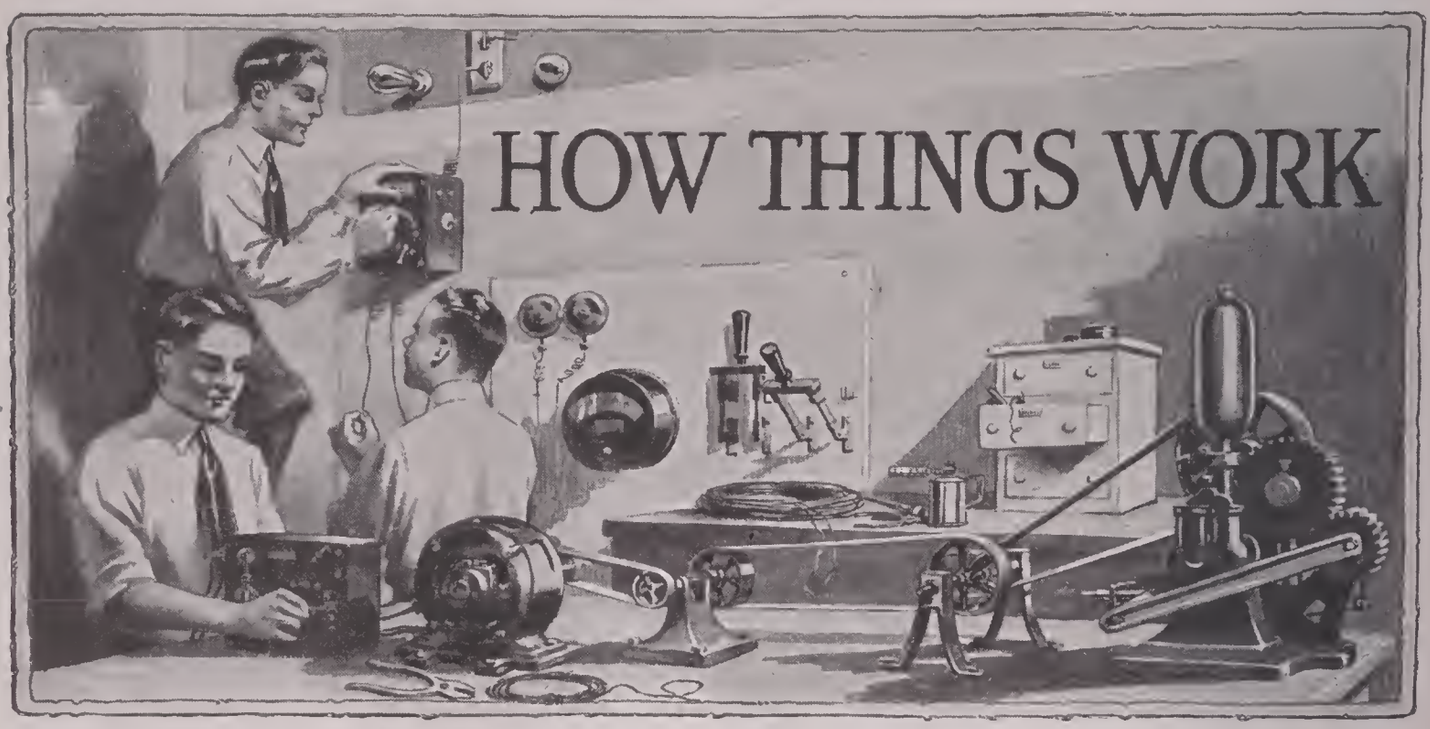
Their Deadly Efficiency

The rate of fire of machine guns depends upon the gun, and varies from 60 or 75 shots a minute to 600. The chief uses in warfare are for destroying an enemy who is advancing to attack, for barrage fire, against aircraft, and by airplanes against airplanes or troops. The ease with which a machine gun is concealed, or protected by concrete or other fortifications, makes it especially adapted to defensive warfare. A few well placed machine guns can spray a stretch of ground with bullets much as a hose sprays a lawn with water, and unless the attackers are willing to accept enormous losses they must withhold their charge until the machine guns have been "smoked out" by artillery fire, tanks, or other special weapons, or have been outflanked by skirmishers.

The first practical machine gun was invented in the United States by Dr. R. J. Gatling of Indianapolis, Ind., in 1861. It consisted of ten parallel barrels operated by turning a crank, and fired as high as 500 shots a minute. The French *mitrailleuse*, invented soon after, was never so practical a weapon as the Gatling gun, which was adopted by the British army in 1875. The Maxim gun was the first of the automatic type. It was invented about 1881 by Sir Hiram S. Maxim, an American inventor who had settled in Great Britain; it was water-cooled. As the Vickers-Maxim gun it was largely used by the British in the World War, and was the official weapon of several other countries. Other types are the heavy Hotchkiss and the light Chauchat, both used by the French army, the Schwarzlose of the Austrian and German armies, and the Madsen light gun used by Norway, Sweden, and Denmark.

The Lewis and Browning Models

Although the Lewis gun, invented by Col. Isaac N. Lewis, was largely used by the armies of France and Great Britain, and by the United States navy, its use in the United States army was confined to the aviation corps. Instead, the American army adopted, in 1918, a heavy and a light gun both of which were invented by John M. Browning, a noted American inventor of firearms, and which are considered superior to all rivals in their respective classes. The Browning machine rifle, which is fired from the shoulder, weighs but 15 pounds and fires a clip of 20 cartridges at one pressure of the trigger, in a space of three seconds. The Browning heavy gun weighs 34 pounds, is water-cooled, and fired from a tripod; it uses belts of 250 cartridges and can fire 20,000 rounds in an hour. This marks an unusual endurance for such arms. These guns were first used in large numbers in the Meuse-Argonne battle, in September 1918; they are officially reported to have "amply justified the faith of the American commander and the ordnance department in their superior qualities."



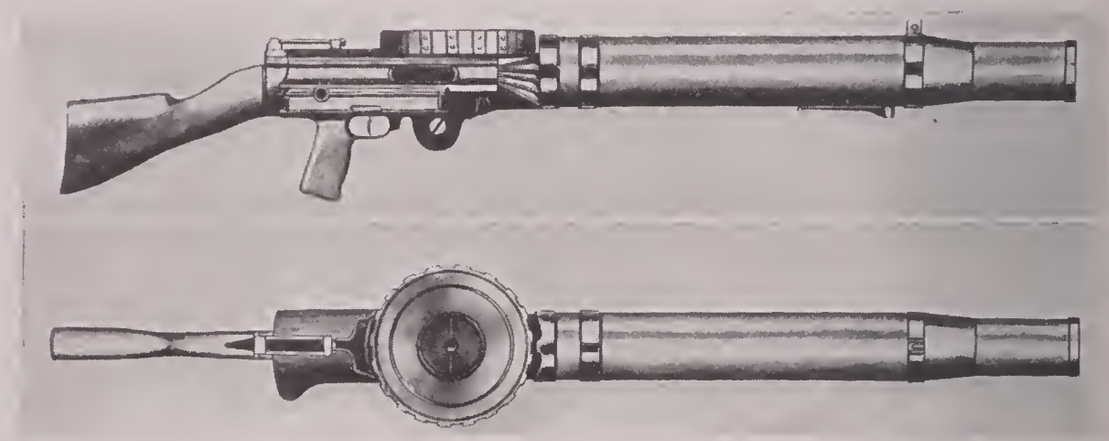
The Machine Gun and Its Mechanism

THE mechanical wonder of the World War was the little machine gun. In four years it must have destroyed millions of lives.

It will do the work of many men. In olden days a man would fire two shots a minute at most with a gun. The machine gun can fire 600 shots a minute.

If we can forget the terrible work it does, this gun must fill our minds with wonder at its cleverness. It works by explosions. It generates a tremendous power, and traps it in the thousandth of a second to work like an engine with the subtlety of a watch.

Practically all machine guns today have the same essential parts; and these pictures of the light Lewis gun, the invention of a United States army officer, widely used in the World War, will show the principles on which they work.



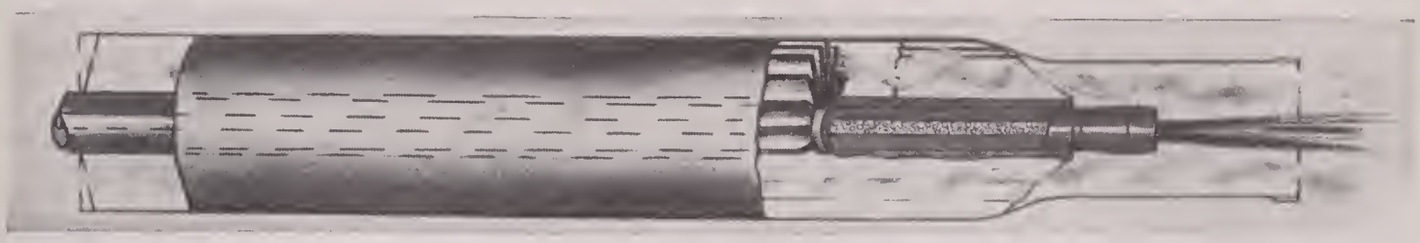
1. The Gun that Loads and Fires Itself. Top and Side Views of the Lewis Machine Gun

The Lewis gun has most of the qualities a machine gun should have—safety, lightness, reliability, and simplicity. It was this little gun that reached such perfection in the war that flying men could take it up in the clouds and fire at the rate of 600 shots a minute *through the spinning propellers of the airplane.*

We see from these two pictures (1) something of the strength and compactness of this gun, with its neat disk-shaped magazine moving around automatically and delivering the next cartridge exactly where it should be at a particular moment.

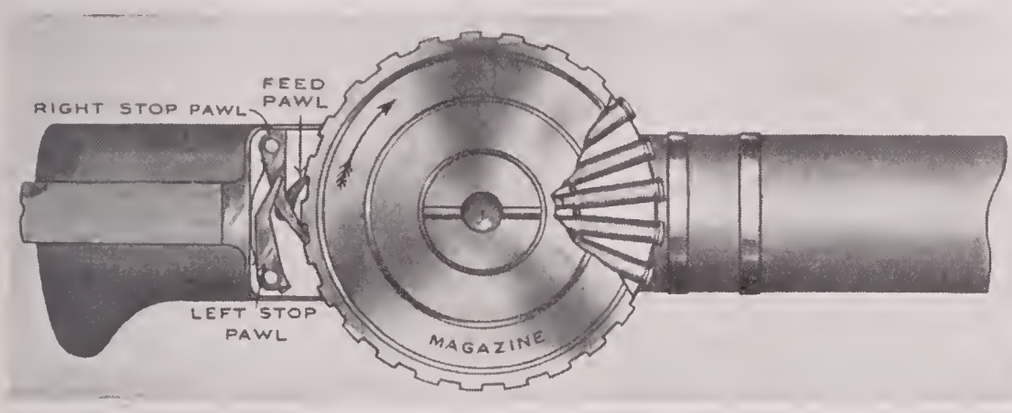
The explosion of hundreds of cartridges a minute in the narrow barrel of a machine gun generates terrific heat, and a gun would soon be useless if this heat could not be got rid of. Everybody knows the radiator of a motor-car, through which a stream of air or water runs to keep the engine cool. There is an air-radiator around the barrel of the Lewis gun (2). The barrel itself is the narrow central tube, the outer casing is the radiator-cover. The radiator itself is ribbed, as seen in this section, and, being made of aluminum, is an excellent conductor of heat. It carries the heat away and keeps the gun in working order. So great is the heat generated in the barrel that it would boil a gallon of water in just over a minute. The gun would be dangerous to use if this heat were not controlled. It is one of the clever devices of the Lewis gun that the rush of gas through the barrel after firing causes a sharp draught of cold air to run through the radiator-tube and carry off the heat the radiator-ribs have taken from the barrel.

For any subject not found in its alphabetical place see information



2. The Rush of Cold Air that Carries off the Heat of the Barrel

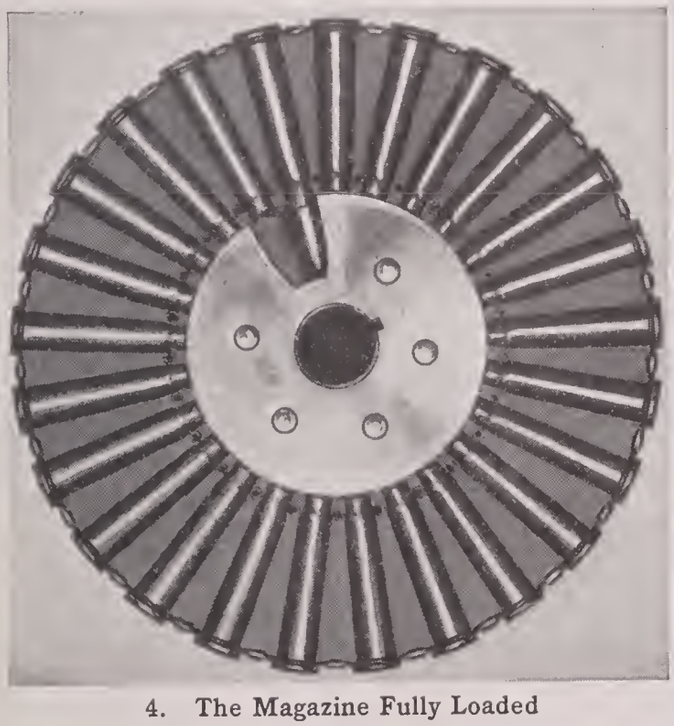
As one cartridge is fired another must be ready to follow, and they slip into their places, if need be, at the rate of ten a second. This picture shows how it is done. The cartridges lie in a spiral in this round



3. The Magazine that Feeds the Cartridges into Their Place

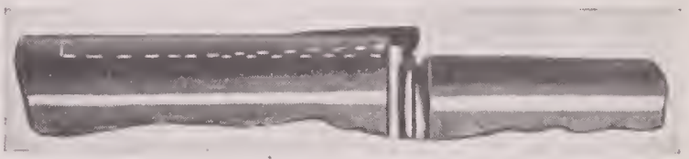
case, the edges of which are toothed, as we see here. When the gun is working, the power of the piston is put behind three little levers, called pawls. There is a feed-pawl, a left stop-pawl, and a right stop-pawl. The business of the feed-pawl is to push the magazine around, so that the next cartridge is ready when the moment comes. The right stop-pawl fixes itself into the teeth of the magazine so as to hold it fast until the time comes for it to move; when that time comes the pawl is pulled back, and the feed-pawl pushes the magazine on. The left stop-pawl fixes itself into the teeth of the magazine so that it shall not slip backwards, but in this picture it is pulled back so as not to hide the feed-pawl, which is underneath. It is the feed pawl that turns the magazine; the other two fix it tight, so that it cannot move until the actual moment for movement comes.

Lying so still and looking so attractive, like a toy for a boy to play with, the magazine of a machine gun (4) is one of the most terrible things on earth today. Half the terrible work of war issues from within this magazine of death.



4. The Magazine Fully Loaded

Here we see one extractor (5) on the front of the bolt about to grip the cartridge case and pull it out after the cartridge has been fired.



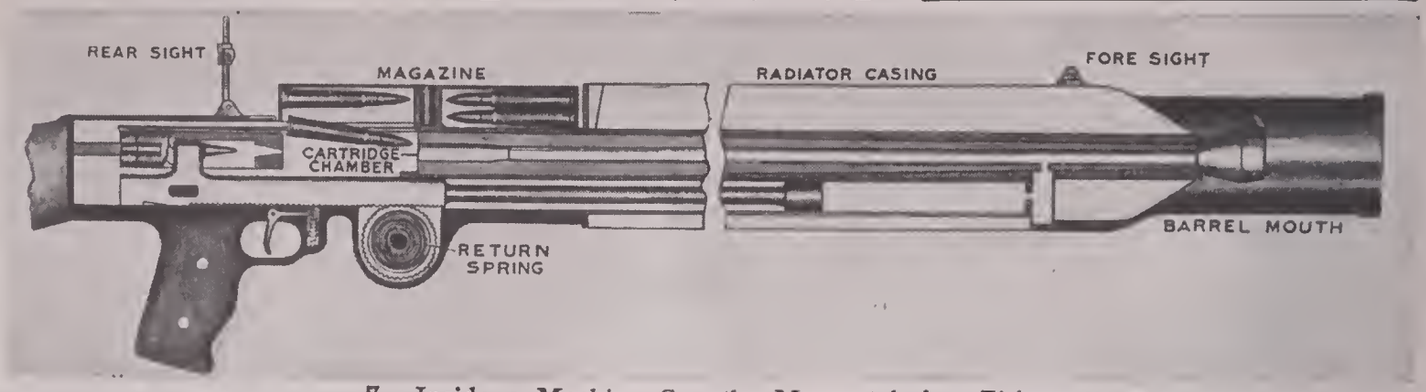
5. The Extractor Gripping the Cartridge-Case

The bolt having started back, dragging the cartridge-case with it, the ejector comes into play. As



6. The See-Saw and the Cartridge-Case

the bolt moved forward it pushed up the front of the ejector, as you can see in the picture (6). As the front rises the back falls like a see-saw. The bolt now

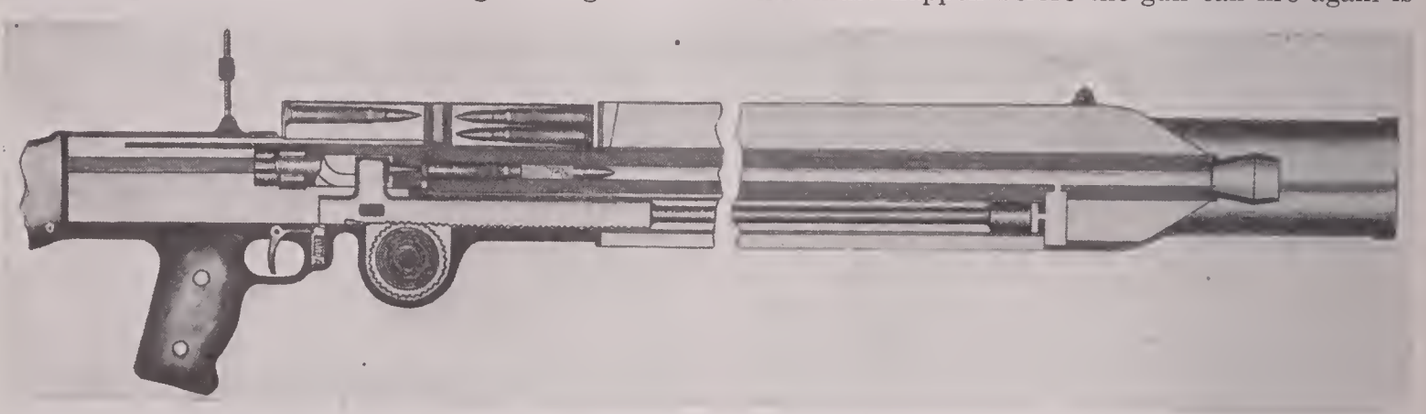


7. Inside a Machine Gun the Moment before Firing

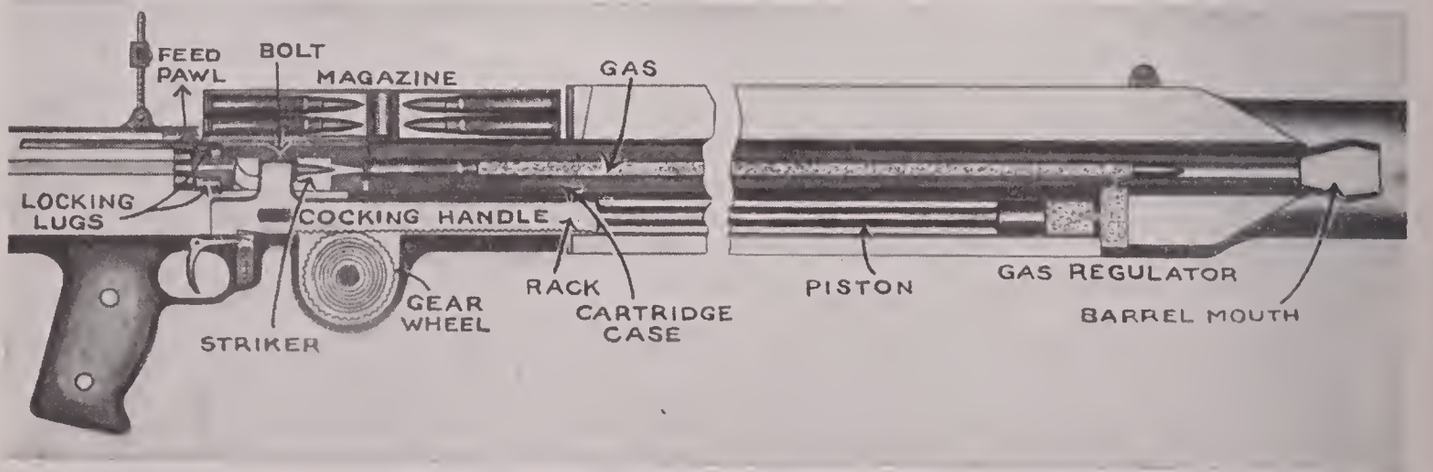
flies right back, pushing up the back of the ejector so that the front falls. The front as it comes down sharply taps the back of the cartridge-case, and pushes it out of the extractors.

The pictures on this page show the marvelous way in which the machine gun works itself. The large picture of the working parts should be studied carefully. Figure 7 shows the cartridge falling. If it is the first time of firing, the cocking handle must be pulled, and then the trigger, for a machine gun must always be started with the trigger. But once started it will run itself as long as the trigger is held and as long as it is fed with cartridges. It is the power of the explosions that works this gun, and the pictures on these pages help us to understand it. In Figure 7 the piston beneath the barrel is pushed back as far as it will go. In coming back the piston is made to wind up a spring, and it is the unwinding of this spring that pushes the piston forward again.

In the next picture (8) the striker has just hit the cartridge, and the bullet is leaving its case. The explosion has just occurred. The piston is as far forward as it can go, and the spring is unwound. What must happen before the gun can fire again is that the piston must fly back and wind up the spring, and this does happen by an arrangement as ingenious as anything that man could devise. The tremendous gas power generated by the explosion is used, of course, in driving the bullet on its way, and most of it follows the bullet through the barrel and is lost. But some of it is caught before the bullet leaves the barrel in that little "gas regulator" hole you see in Figure 9, and this drives the piston back.

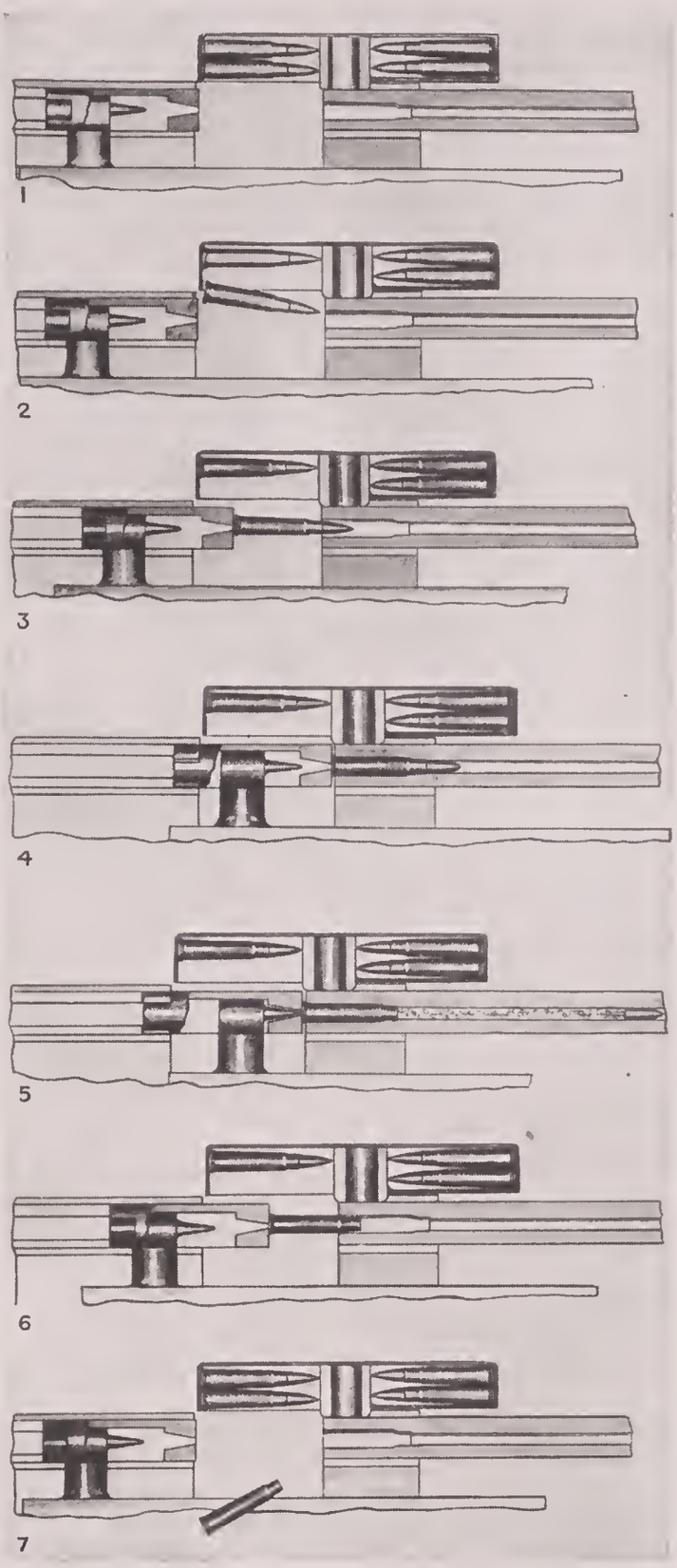


8. Inside a Machine Gun at the Actual Moment of Firing



9. Inside a Machine Gun after the Moment of Firing while the Bullet is on its Way through the Barrel

The whole of this wonderful mechanism depends on the thousandth part of a second that it takes the bullet to pass through the barrel. It is only within this twinkling of time that the power of the gas can be trapped; the moment the bullet is out the gas flies after it. And what happens is that the gas imprisoned in the barrel rushes through the hole near the end (9). Here it finds itself in a little chamber, where it is cleansed from its impurities, and from this chamber the gas rushes through another hole into the piston-cylinder. It comes up against the piston and flings it back, and the whole mysterious process of the working of the gun is now assured. Fixed to the end of the piston is a toothed rack, with its teeth fitting into a gear-wheel, and in the center of this gear-wheel is fixed the spring we have already seen. As the piston flies back the rack flies back too, and turns the gear-wheel around, so winding up the spring. There are other things the piston does when it flies back—it carries back with it the striker and the bolt, and it enables the feed-pawl to turn around the magazine and bring the next cartridge into its place. All this the piston does before the bullet leaves the gun; and now, with the bullet gone, the power that drove the piston is gone too, for the gases rush out into space. Their energy is spent, but they have done their work, and, most of all, they have wound up the spring.



10. What Happens to the Cartridge

With the gases spent and nothing to resist it, the spring unwinds like a lightning-flash and drives the piston on. Flying forward, the piston draws the bolt and works all the marvelous mechanism in the gun. The feed-pawl slips into the next tooth of the magazine, the nose of the next bullet is guided downwards, the bolt presses it home in the breech, the locking lugs fix the bolt fast, the striker leaps forward and hits the cap, and there is a new explosion. So the wonderful round goes on, generating power and harnessing it to these levers and wheels and springs, so that they work with the perfection of a watch 600 times a minute.

Now that we have seen the power of the gun applied, let us go back and examine in detail the ingenious way in which the magazine feeds the cartridges to the hungry barrel.

In the first of these pictures (10) we see a section through the center showing it fully loaded. One of the cartridges is ready to drop, and in the second picture it is seen falling, pushed down by a kind of spring. It reaches a point level with the breech, the bolt moves forward, and pushes the cartridge into the barrel. The fourth picture shows the bolt close up and the cartridge right home. The bolt is now securely locked so that the explosion cannot move it. The fifth picture shows the striker hitting the back of the cartridge and the bullet speeding on its way through the barrel. We have now finished with the bullet. It will fly through space at half a mile a second. In the sixth picture we see how the empty shell is drawn from the barrel by the extractor, already described in Figure 5, on page 2099. The seventh picture shows the cartridge as it is knocked from the gun by the ejector which we saw in operation in Figure 6. All this happens faster than you can think.

Mackenzie river. The greatest river of Canada and the second greatest in North America, the Mackenzie flows nearly 2,500 miles from its source in the Rocky Mountains to the Arctic Ocean. It drains an area which is 100,000 square miles larger than the basin of the Great Lakes and the St. Lawrence. In its course it gathers the waters of three immense lakes—two of them larger than Lake Erie—Lake Athabaska (2,850 square miles), Great Slave Lake (nearly 10,000 square miles), and Great Bear Lake (11,200 square miles). Great Bear Lake lies so far north, partly within the Arctic Circle, that its surface is frozen for nine months of the year.

From its source to Lake Athabaska, this mighty river is known as the Athabaska River; thence to Great Slave Lake, as the Slave River; and from there to its mouth as the Mackenzie. In summer steamboats of the Hudson's Bay Company ply from Great Slave Lake almost to the river's mouth, where it spreads into many branches flowing through a wide flat delta. The Athabaska and its other great tributaries, the Peace and the Liard, are navigable much of their length for steamboats of shallow draft. Nowhere is the Mackenzie proper less than half a mile wide, and in its widest reaches it expands to three and four miles. Most of its course is through virgin wilderness, heavily wooded in many of the upper parts, a paradise for sportsmen and trappers. Large deposits of oil have been discovered on the Mackenzie only 150 miles south of the Arctic Circle.

The Mackenzie River was named for Sir Alexander Mackenzie (1755–1820), a Scotchman in the employ of the Northwest Fur Company, who in 1789 explored the river to its mouth and three years later crossed the Canadian Rockies to the Pacific, the first white man to accomplish the trip.

Mackenzie, William Lyon (1795–1861). As inspirer and leader of the unsuccessful rebellion of 1837, William Lyon Mackenzie occupies a place in Canadian history much like that of Daniel Shays and John Brown in the history of the United States. Honest in purpose, aflame with righteous rage at intolerable evils, but hasty and fanatical in temper, he flung counsels of prudence to the winds and took up the sword to cure the ills which afflicted Upper Canada (Ontario). The rebellion itself was crushed almost before it started, but it hastened by years the redress of the grievances which provoked it.

Mackenzie had come to Canada from Scotland at the age of 25, after a youth of poverty and toil. He found in Upper Canada increasing discontent against the autocratic rule of a stubborn Tory governor and a small political clique, nicknamed the "Family Compact," which monopolized public office. A born agitator, Mackenzie threw himself heart and soul into the struggle. First at Queenstown, then at Toronto, he published a newspaper, *The Colonial Advocate,* in which he assailed the office-holding class and demanded governmental reforms. Just as he was on the point of ceasing publication for lack of funds, a mob wrecked his printing office, and the heavy damages awarded him by the courts enabled him to start anew. His last paper was named *The Constitution.* Five times elected to the parliament of Upper Canada, he was five times expelled by his political foes. In 1834 he was elected first mayor of Toronto (formerly York) and was returned to parliament, this time being allowed to take his seat, since the Reformers were now in the majority. Two years later, trickery and bribery again swung the elections against the Reformers, and Mackenzie soon began openly to advocate a republican form of government, working hand in hand with the Reformers of Lower Canada (Quebec) who were already planning revolt (*see* Papineau, Louis Joseph).

On Nov. 25, 1837, Mackenzie proclaimed a provisional government for Upper Canada and by Dec. 7 he had gathered a force of 800 or 900 insurgents near Toronto. The rebels were speedily routed by the government forces, and Mackenzie fled across the Niagara frontier to the United States. Seizing Navy Island in the Niagara River, he troubled the Canadian frontier for a few weeks, but was captured by the authorities of the state of New York and imprisoned for breach of the neutrality laws. He was released a few months later and remained in the United States until 1849, when the passage of an amnesty act allowed him to return to Canada. From 1851 to 1858 he was a member of the Canadian parliament, allied with the extreme Radicals.

Mackerel. Next to cod and herring, the mackerel is the most important food fish of the North Atlantic. It is a smooth, regularly formed fish with a deeply forked tail, characterized by its beautiful protective coloration — bluish green above, mottled or barred with black, and iridescent silver beneath. The scales are very minute and are absent from the head. Although there are very few species, mackerel have a wide range and are found in shoals, sometimes of immense size, in nearly all tropical and temperate seas. They spawn in the open sea, but migrate periodically towards the shore in pursuit of shoals of herring and their fry, which form their principal food. When herrings are scarce they live on small crustaceans.

The common mackerel of the North Atlantic (*Scomber scombrus*) is usually from 14 to 16 inches long and weighs about two pounds. It sometimes attains a much larger size, but the smaller fish are considered better for the table. Some species of mackerel possess a swim bladder; this one does not.

In the New England states and Nova Scotia, and in Norway, Ireland, and Great Britain, mackerel fishing is a most important industry. In Europe small boats and hand-lines are used almost exclusively, but on the American side much of the fishing is done from seagoing schooners equipped with purse-seines, by means of which whole schools can be captured. The fishing begins in March or April and the spring catch is generally sold fresh, while the summer catch is split and salted for the market. (*See* Fisheries.)

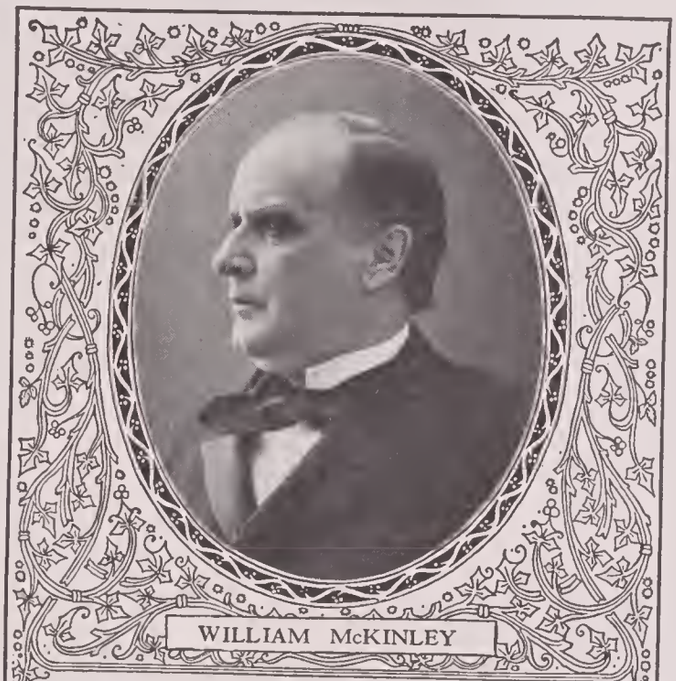
McKINLEY, MOUNT. "I would rather climb that mountain than discover the richest gold mine in Alaska," exclaimed Archdeacon Hudson Stuck, as the splendid vision of this highest mountain of North America, rising in majestic whiteness to a height of 20,464 feet in south-central Alaska, spread before his eyes. The steep ice-polished slopes, the terrible cold, and the dangerous thin air did not deter him, as they had not deterred others before him. Finally in June 1913 he succeeded where others had failed, and stood the first on the top of the continent—"alone upon a dead world, as dead as the mountains of the moon." The snow-covered mountains around, he reports, "dwindling and fading, arose to our view as though floating in thin air," and above "the sky took a blue so deep that none of us had ever gazed upon a midnight sky like it before."

Denali or Traleyka is the name by which the natives know the mountain. It received its present name in 1896 in honor of President McKinley.

McKINLEY—WAR PRESIDENT *and* MARTYR

McKINLEY, WILLIAM (1843–1901). The administration of William McKinley, the 25th president of the United States, may be regarded as closing one era and beginning another. With him ended the line of presidents who had fought in the Civil War. The breach between the two sections was completely healed, and in the Spanish-American War, which came while he was president, men from the North and South fought side by side.

This new era was one in which America first took rank as a world power. By the Spanish-American War she acquired colonies thousands of miles from North America; the Hawaiian and part of the Samoan islands were annexed; and the United States sent troops across the Pacific to take part with European armies in a war in China. McKinley's administration saw also the beginning of a new industrial era, marked by the rapid growth of "big businesses," with their new financial and industrial problems, including those of government control, and the controversies between labor and capital.



WILLIAM McKINLEY

McKINLEY'S ADMINISTRATION
1897–1901

Dingley tariff passed (1897).
Gold discovered in Alaska (1897).
Marconi makes "wireless" practicable (1897).
Battleship 'Maine' blown up in Havana harbor (Feb. 15, 1898).
War with Spain follows (1898).
Philippines, Porto Rico, Guam, and Cuba acquired by Treaty of Paris (1898).
Hawaiian Islands annexed (1898).
Samoan Islands divided with Germany (1898).
Philippine insurrection suppressed (1899) **and civil government prepared for.**
United States participates in First Hague Peace Conference (1899).
Secretary Hay secures "open door" policy in China (1899).
Troops sent to China to aid against Boxer uprising (1900).
Gold standard adopted (1900).
McKinley reëlected on "full dinner-pail" platform (1900).
Assassination of McKinley (Sept. 6, 1901).

Like many others of the leading statesmen of America, McKinley was of Scotch-Irish descent. Tradition tells us that the family was descended from the great MacDuff, who, according to Shakespeare, overthrew the usurper Macbeth.

Roosevelt described Mr. McKinley after his tragic death as a "good citizen, brave soldier, a wise executive." His bravery as a soldier was proved in the Civil War; for, enlisting as a private in 1861, he had risen to the rank of major of volunteers by the time he was mustered out of service in 1865. His first commission was won at the Battle of Antietam when, under heavy fire, he had carried food to the men on the firing line.

But health, not promotion, was McKinley's greatest gain during the war. In 1860 he had been obliged to give up his school work at Alleghany College, in Meadville, Pa., because of ill health. By 1865 he had built up the strength which was to carry him through a strenuous public career.

Like most presidents of the United States, McKinley was a lawyer, having been admitted to the bar in 1867. Like most of them, also, he had served in Congress. From 1870 till 1890 he was in the House of Representatives, with the exception of the term 1883–85. In the House he had devoted his chief attention to the tariff, and in 1890 as chairman of the Ways and Means Committee he introduced the bill which became the tariff act known by his name, providing in many cases for extremely high protective tariffs. This "McKinley Tariff" made his name known in other

countries, and gave him the position of Governor of Ohio, as the candidate of the Republican party in 1891. It also helped to make him the Republican candidate for the presidency in 1896, with Garret A. Hobart of New Jersey as the candidate for the vice-presidency.

In spite of the Democratic opposition to the McKinley Tariff, however, the chief issue in that presidential campaign was not the tariff but the free coinage of silver. The Democrats, with William Jennings Bryan as their candidate, pledged themselves to the free and unlimited coinage of silver at "16 to 1." This meant that anyone could take silver bullion to the mint and have it coined into dollars at the rate of 16 silver dollars by weight to one gold dollar—although the silver in a dollar at that time was actually worth less than 50 cents. McKinley thought this would make "cheap money" which would benefit those who owed money as against those to whom it was owed; also, that unless other countries adopted such a policy, the United States would soon have no gold money left.

The election of McKinley was taken to mean that the people were in favor not only of a "gold standard" as opposed to a "silver standard" but also of a high protective tariff. So immediately after his inauguration he called a special session of Congress to act on the tariff. As a result the Dingley tariff bill was passed, which increased the duties which had been changed from those of the McKinley Act by the Democratic tariff law of 1893.

It was not until 1900 that a law was passed on the question of money, which had been the issue of the campaign. In that year the gold dollar was declared to be the standard of the United States, and the coinage of silver was strictly limited.

The Spanish-American War

One reason for the delay in dealing with the money question was the attention needed for foreign affairs, chief of which was the Spanish-American War. At the time of McKinley's inauguration, Cuba was in revolt against Spain, and many Americans urged the president to aid the Cubans. This McKinley at first refused to do; but in February 1898 the United States battleship *Maine* was blown up in the harbor of Havana, and 264 of her crew were killed. A commission appointed to investigate reported that the loss must have been caused by an explosive mine. It was generally believed that Spain was to blame for the explosion, and in April war was declared against her (*see* Spanish-American War). In the treaty of peace which closed the war, Cuba was freed from Spain, but placed under the control of the United States until she could set up a government of her own. Porto Rico, Guam, and the Philippines were ceded by Spain to the United States, in return for a payment of $20,000,000.

During the war the Hawaiian Islands were also annexed by a joint resolution of Congress. The ruling class in these islands had been wanting to come under the United States government for several years, but President Cleveland had withdrawn the treaty of annexation from the Senate. The situation was now changed, in part by the need for naval stations in the Pacific revealed by the war.

Even before the peace treaty was signed, the natives of the Philippine Islands were in rebellion against the United States. Under their leader Aguinaldo, they sought to set up an independent government of their own, free alike from Spain and the United States. The rebellion was put down in course of time, and a commission was appointed to set up the government of the United States in the islands. At the head of this commission was Judge William Howard Taft, later president of the United States.

One result of the Spanish-American War was greatly to increase the respect of other countries for the United States. This was raised still higher in 1900 by the participation of American troops in the suppression of the Boxer uprising in China.

Struck Down by an Anarchist

When McKinley's first term closed the country was enjoying increased prestige abroad and unusual prosperity at home. He was triumphantly reëlected in 1900, to the cry of "a full dinner-pail for four years more." A trip which he made through the South and West showed that he had the support of the whole people, more than had any president since Andrew Jackson. But on his return to the East he was shot down on Sept. 6, 1901, by an assassin at Buffalo, N.Y. The man who did the shooting, Leon Czolgosz, was a crack-brained anarchist of Polish descent, who believed that all government was wrong and that all political rulers should be killed. The stricken president died on Sept. 14, and Vice-President Roosevelt was immediately sworn in as McKinley's successor.

Memorial services were held for McKinley in all cities and towns in this country, and in many places in the British Empire and even in far-off China. As president he had won the respect of citizens of foreign countries; as a man he had won the love of the people of his own land. All were impressed by his gentleness and devotion to his invalid wife. A senator once remarked that President McKinley made it hard for all the other husbands in Washington, because they were expected to live up to the example he set.

McKinley did not possess the personal magnetism that men like Clay had, but on the other hand he had such a genuine kindliness that few could help liking him. "If men would not die for him as they would for some great leaders," says one writer, "they would at any rate vote for him, which after all was much more to the point."

As a statesman it is hard to judge McKinley. One member of Congress said that McKinley never had a chance to show what kind of a president he would make, for the Spanish-American War interfered with his first term, and he was shot soon after the beginning of his second. The chief criticism that was made of him was that he "kept his ear close to the ground"

so that he might catch the earliest signs of popular opinion. He believed that as a chosen representative of the people he was to carry out their wishes. This led him to change his position frequently. For instance, on the day before he was shot he spoke in favor of removing the restriction from trade, although always before he had stood for high protective tariffs.

Whether he was a great statesman or not, McKinley's administration will always be regarded as an important epoch in the history of the country because of the great events which marked it.

MADAGASCAR (*măd-ȧ-găs'kȧr*). In a far-away island of the South Indian Ocean 240 miles from the Mozambique coast of Africa, live a tall graceful intelligent brown people who call themselves "Malagasy." The geographies, and perhaps their French rulers, too, say they are lazy. Their land is Madagascar, the fourth largest island in the world with its 228,000 square miles, 980 miles long and 360 miles wide.

It would be a temptation to be lazy if you lived in this land of the "travelers' tree," where life is so simple. From its tall slender trunk topped by a swaying crown of plantain-like leaves the framework of the little huts built by the forest and coast tribes is made; its slender stalks stripped of the leaf go into the partitions and the walls. A cup at the base of the leaves furnishes the native water as he builds, and it is from this store of water that the tree derives its name. Floors are made of the flattened-out bark of the travelers' tree; and roofs of the long leaves cut or folded lengthwise. Thick and green, renewed from time to time, and clean, they are a splendid protection against the sun's rays, which are uncomfortably hot at most seasons of the year in Madagascar; for nearly all of the island lies within the torrid tropics.

When mealtime comes, the tablecloth, woven of fibers from the great leaves of the travelers' tree, is spread on the floor or the ground. There is rice to eat, its tender kernels huge and sweet; for it is the Malay who knows how to cook this "staff of life," and the Malagasy is mostly Malay, with some Caucasian blood and a little mixture of his black neighbors across the Mozambique channel. There will be breadfruit, too, and bananas, sweet potatoes perhaps, all served on pieces of the leaves of the travelers' tree. Cut into little squares and rolled into a cornucopia, the leaf makes a fork or spoon, or a glass. With the left hand the little horn is filled with rice, which is emptied into the right hand, from which it is eaten. By following this roundabout process neither the food nor the dishes can be contaminated by saliva, which is to them unclean—a notion borrowed from the Hindu with whom they have traded for centuries.

Some of these talkative, soft-spoken, amiable Malagasy wear European clothes. Since 1896, after its conquest by General Gallieni, Madagascar has been a French colony, and for 80 years before that it had been a sphere of both French and British influence. But the workaday costume of the natives is merely a loin-cloth over which is draped a long rectangle of cloth that gives them the look of the

HAULING FREIGHT IN MADAGASCAR



Labor is cheap and plentiful in the great island, so porters do most of the carrying. Though these natives are not particularly strong in appearance, they can carry huge loads great distances over steep trails.

YET SOME CALL THE MALAGASY LAZY



As a rule, Madagascar women are more industrious than the men. They weave cloth and make hats from fiber furnished by the "traveler's-tree," which is the great provider of necessities for the folk of the island.

ancient Romans. This cloth also is woven by the womenfolk, who are more intelligent and more industrious than their men, from the fibers of the useful traveler's-tree.

Larger than France, to which it belongs, Madagascar has a population of about 3,546,000. It is ruled, under a French governor-general and a council of administration, from Antananarivo, the capital, in the heart of its great semi-arid central plateau. This has always been the land of its ruling tribe, the Hovas, who are of Malay descent and live in houses built of wood or brick or of the red soil. Among the natives old pagan beliefs, lax morality, and indifference to human life—children born on unlucky days are still killed by some tribes—are curiously mixed with professions of Christianity, hospitality, and reverence for the aged. Women have always occupied a higher place among the Madagascar natives than is usual among similar uncivilized peoples.

Many of the native animals are different from those of the neighboring continent of Africa. They are more like the Asiatic or Malayan animals, and indicate a time when the bed of the Indian Ocean was connecting land. The island is especially the home of the curious lemurs and the chameleons (*see* Chameleon; Lemurs).

Agriculture is the chief employment. Rice, cattle, rubber, bee products, rafia, and straw for hats are the leading products. Madagascar's mineral wealth especially in iron ores is considerable. Gold is exported. Its principal port, Tamatave, on the east coast, carries on an extensive trade with France and Great Britain.

Madeira (*mȧ-dē'rȧ*). The traveler who approaches the Madeiras, a small group of rocky islands belonging to Portugal, 360 miles off the northwest coast of Africa, gets his most picturesque impression when his steamer enters Funchal, the chief port and capital city of the island which gives its name to the group. Natives—chiefly of Portuguese descent with some Moorish or negro intermixture—noisy dark-skinned fellows, some wearing the "carapuça," a small blue funnel-shaped cap, surround the vessel. Their small boats are filled with wares such as cane chairs, basket work, red bananas, pineapples, custard apples, pomegranates, and other tropical fruits, and sometimes beautiful lace and embroidery. Others, swarthy and half-naked, plunge from their canoes into the water after the coins tossed them by the passengers. Within the city one sees, among other strange sights, wooden sledges and cars on runners drawn by bullocks, for in the Madeiras wheel-carriages are rare.

Madeira is a rocky island of volcanic origin, 35 miles long and 12 miles wide, with a few scant forests, deep narrow ravines, and lofty rugged peaks (4,000 to 6,000 feet high) often covered with snow. Bold precipices rise abruptly from the coast and in parts the scenery is wild and beautiful. The climate is mild and uniform, and the island is noted as a health resort, especially for persons suffering from diseases of the chest. The absence of rain during the summer and the rocky and hilly nature of the land have made cultivation difficult.

The two staple products are sugar and a wine that is world famous. Vegetables and a variety of fruits are grown—apples, pears, and peaches of poor quality, oranges, lemons, grapes, guavas, figs, bananas, and pineapples, the last two forming articles of export.

Besides the island of Madeira, one other of the group, Porto Santo, is inhabited. The Madeiras are supposed to have been known to the Phoenicians in ancient times and were rediscovered by a Portuguese explorer in 1419 and colonized about 30 years later. Because of their location they played an important part in the early explorations down the west coast of Africa. Madeira is today a port of call for steamers between Europe and South Africa. Area, 314 square miles; population, 170,000.

MADISON—"FATHER *of the* CONSTITUTION"

The Author of the Famous "Virginia Plan" around which the Framework of the Union was Built—How His Wife, Dolly Madison, Helped to Raise Him to the Presidency—The Shadow of the War of 1812

Madison, James (1751–1836). When Martha Washington heard of Dorothea Todd's engagement, in 1794, to Congressman Madison, she said, "Dolly, you pretty minx, make this bachelor better known and more popular." Dolly did both. She didn't know as much about books as did her scholarly husband, but she did know how to get him into society, and to win countless friends for him by her kindness and tact. Washington Irving describes her plump beauty as a marked contrast to her husband's small feeble figure and wizened face—for Madison was "a small man, quiet, somewhat precise in manner, pleasant, fond of conversation, with a certain mixture of ease and dignity in his address."

Madison, like Washington, Jefferson, and Monroe, was a Virginian by birth. His father owned the large estate of Montpelier, in the then frontier county of Orange. But though possessed of many acres, the Madison family did not belong to the aristocracy or "first families" of Virginia. The family funds, however, were sufficient to provide a good education for James, the eldest son. When he was 18 years old he entered Princeton University, from which he was graduated in 1771; and he then spent another year there studying Hebrew, the history and government of ancient civilizations, and the principles of law.

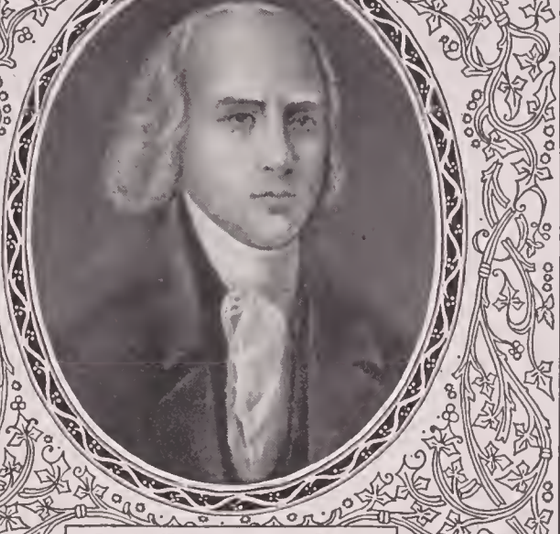
At that time he intended to enter the ministry. But politics—a pursuit for which he was eminently

adapted—soon claimed his attention; and from 1776 to 1817, with the exception of about four years, he served continuously in public office. In that time he was a member of the Virginia Assembly, of the Continental Congress, and of the House of Representatives under the new constitution. He had been a member of the convention which framed the constitution of Virginia in 1776, and was one of the leaders in the Constitutional Convention in Philadelphia, in 1787, which framed the Federal Constitution.

Indeed, Madison's chief claim to fame is the work which he rendered in connection with the formation and adoption of that Constitution. He had no sooner entered the Continental Congress, in 1780, than he saw that the national government needed more power. He worked for this both in Congress and in the Virginia assembly, to which he returned in 1784 for a second term; but it was impossible to accomplish anything under the old Articles of Confederation.

When the Philadelphia Convention was called in 1787 to revise the Articles, Madison drew up a plan for a new form of government. This scheme, modified in some details, was introduced into the convention as the "Virginia plan," and on it the new constitution was based. For this work and his other services in that connection, Madison is known as the "Father of the Constitution." In the convention he spoke more frequently than any other member, except Gouverneur Morris and James Wilson. Furthermore, he took careful notes of all proceedings, and this journal, published by order of Congress after the death of all members of the convention, is our most precious source of information concerning the proceedings of that body, which took place in the most profound secrecy.

Madison's work did not stop with the formation of the Constitution. With Alexander Hamilton and John Jay, he wrote a series of essays explaining the new instrument of government and giving reasons for its adoption. These essays, which appeared first in newspapers and later were published in book form, under the title of 'The Federalist', secured many converts for the Constitution, and remain today one of the best commentaries on the work of the "Fathers" who established the government.



JAMES MADISON

MADISON'S ADMINISTRATIONS
1809-1817

Harrison defeats Indians at Tippecanoe (1811).
Re-charter of United States Bank refused (1811).
Louisiana admitted (1812); **Indiana** (1816).
Continued aggressions of England and France lead to war with England (1812–15).
Reëlection of Madison on war platform (1812).
Perry's victory on Lake Erie (1813).
Washington burned by British (1814).
Jackson crushes Creek Indian uprising (1814); **defeats British at New Orleans** (1815).
Treaty of Ghent leaves question of impressment unsettled.
Hartford Convention (1814) **leads to fall of Federalist party.**
Second United States Bank chartered (1816).
Mildly protective tariff passed (1816).
Policy of Federal aid to "internal improvements" begun (1816).
Monroe elected President (1816).

Madison hurried home from the Constitutional Convention to secure election to the Virginia state convention, to which the Constitution would be submitted for ratification. In this convention he vigorously opposed the aged Patrick Henry, who thought that the rights of the people would not be secure under the new form of government. In spite of the strong opposition of the Anti-Federalists, Madison finally triumphed and Virginia ratified the constitution.

But Madison evidently thought that there was some justice in the arguments of the Anti-Federalists, for in the newly organized House of Representatives, which he entered in 1789, he became the leader of Jefferson's party favoring strict construction In 1798, also, while in retirement, he wrote the famous Virginia Resolutions, adopted by the legislature of that state, which condemned the repressive alien and sedition laws passed by the Federalists, and claimed that a state could "nullify" an act of Congress.

With the accession of Jefferson to the presidency, in 1801, Madison became secretary of state. Since Mrs. Jefferson was dead, it fell to the lot of pretty "Dolly" Madison, his wife, to act as hostess at the president's state dinners. The many friends she won, together with Madison's great ability and purity of character, and Jefferson's support, caused Madison in 1808 to be chosen the fourth president, by an electoral vote of 122, to 47 given for Charles C. Pinkney, the Federalist candidate. George Clinton of New York, who had served as vice-president in Jefferson's second administration, was reëlected to serve in the same office under Madison.

contained in the Easy Reference Fact-Index at the end of this work

The work of setting up the government and giving it the needed strength had been successfully accomplished under Washington's administration, and a democratic trend had then been given to it by Jefferson; so Madison did not have to deal with these fundamental problems. But the shadow of war hung over his whole term of office. His first years were occupied with the disputes with England and France, which culminated in 1812 in a declaration of war against England (*see* War of 1812).

Madison, with Elbridge Gerry of Massachusetts as the candidate for vice-president, was reëlected in 1812 over De Witt Clinton of New York, the Federalist candidate, by 128 electoral votes to 89.

It must be admitted that Madison's administration of the war was far from efficient. He was hampered both by his own lack of ability as an executive, and by the violent opposition to the war of the New England Federalists, who in December 1814 met in the famous Hartford Convention, which was suspected of planning New England's secession from the Union.

The End of the Federalist Party

With the peace of Ghent (Dec. 24, 1814), this opposition collapsed and the charge of disloyalty against the Federalists caused the death of their party. In spite of the fact that there was only one political party and that that party in theory favored strict construction and states' rights, various nationalistic tendencies developed during Madison's administration. These were shown in the new protective tariff law, and in the chartering of the second Bank of the United States, both in 1816.

In 1817 Madison retired to his estate at Montpelier, where his efforts as a planter were no more successful than were those of his friends, Jefferson and Monroe. Like them he was interested in education, and he served with them as regents of the University of Virginia, to which he left his library after his death.

Madonna. The Italian word Madonna ("my lady") has become by almost universal usage the name by which we designate Mary, the mother of Jesus. After the 4th century the reverential adoration of the Christ-mother assumed a large part in the minds of the great mass of the common people, for, after the Council of Nicea in 325 had clearly fixed the place of the Son in the Trinity, he seemed less of an intercessor and more one with God himself. What more natural than that his mother, in whom all early Christians might also honor womanhood, should be a refuge to the faithful, who might through her and her intercession approach the Father and the Son with their humble prayers? The church in its beliefs and doctrines could not remain untouched by this, and the Virgin Mary assumed a larger and larger place in daily worship in the succeeding centuries.

So also she naturally became the favorite theme of Christian art from its simple beginnings to its glories in the Renaissance. Such quaint stiff little figures they painted of her in the early days! Often her arms were extended in prayer, and she always wore a blue robe starred or slashed with gold which was draped over her head. The Madonna became much more natural and beautiful when Italian artists in the 13th century broke away from the old Byzantine types. Then Fra Filippo Lippi—discarding even the gold backgrounds that were then so popular—painted some charmingly lifelike pictures of the Mother and Child. Botticelli and Leonardo da Vinci also created some beautiful real Madonnas.

All the earthly and heavenly scenes that legend gave them of the life of "my lady" the artists painted—the superficial, unbelieving, and time-serving artists as well as the truly great and sincere. How dreamy, exalted, loving, are these beautiful Mother visions of the greatest masters! Andrea del Sarto's 'Madonna of the Sack', Leonardo da Vinci's 'Madonna of the Rocks', Titian's glorious colorful 'Assumption', Correggio's sweet and tender 'Holy Night', Murillo's vision of the 'Immaculate Conception'—one cannot begin to name the Madonna masterpieces of the world's artists. But though striking and beautiful Madonnas have been lovingly painted by artists of all lands, there is one painter whose work in this field is supreme. "Oh, their Raphael of the dear Madonnas!" sang Browning, thinking of the 50 or more celebrated Madonnas painted by the Italian master. Raphael's two most famous paintings are that perfect mother picture 'The Madonna of the Chair' (Madonna della Sedia) and the glorified painting of the Christ-mother descending from the heights of Heaven, clasping her thoughtful little Son. In her eyes are the conscious wonder and reverence of one who beholds afar His destiny as Savior, while below St. Sixtus and St. Barbara kneel in adoration—the world's favorite 'Sistine Madonna'. It is set apart in a room by itself in the gallery at Dresden.

In sculpture, too, the Madonna has been glorified, the finest examples perhaps being Michelangelo's 'Madonna of Bruges' in the Bruges Cathedral, and his poignant and very lovely 'Pietà' of St. Peter's.

Madras (*mă-drăs'*), India. A flat country prickly with cactus, and drab, pyramid-like temples, a land of red and black—black cattle straggling along red roads, swarming little black people in red loin-cloths, bearing the red triangle of the god Vishnu on their foreheads—such is the presidency of Madras in southeast India.

Madras is India as you have always pictured it, the India of toddy palms, rice-stalks standing in water, and gaunt natives naked above the loins, sharp-featured and quick-eyed with heads close-cropped before and streaming with ragged locks behind.

The capital of the presidency and its chief seaport is the city of Madras, the third city of India, founded by the British nearly 300 years ago. It spreads back from the breaker-tossed shore for miles and miles into the country, a city of suburbs; each house set in the midst of a walled yard, called a "compound," that is almost a park in attractiveness.

THE WORLD-FAMOUS 'MADONNA OF THE CHAIR'



Raphael's masterpiece, now hanging in the Pitti Gallery in Florence, owes its origin to a curious incident. For years Raphael had searched for a fitting model, but did not find her, until one day he encountered a peasant woman seated and holding a boy in her lap, while another stood nearby. She was exactly the type he had been seeking. Raphael had a pencil, but nothing else, so he seized a smooth barrel head and made his sketch upon its round surface. From this sketch he worked out what has since been called "the most popular painting ever made."

As you view the city from the top of the lighthouse the red huddled roofs of "Black Town," the native quarter, are only a speck at your feet. On one side is the turquoise sea, the white line of surf, and leagues of broad empty yellow beach. Along its edge runs the Marina, gay with carriages in the late afternoon when the British residents and wealthy natives come out to enjoy "the doctor," the sea breeze that makes life quite bearable in the evening along this tropical coast where the thermometer rarely falls below 65 degrees and the range of temperature is not more than 10 or 12 degrees from one year's end to the next.

IN THE GARDENS OF THE SPANISH ROYAL PALACE



The view shows a part of the eastern side of the palace with the Plaza del Oriente and the equestrian statue of Philip IV in the foreground. The palace was begun under Philip IV in 1737 by the Italian architect Sacchetti, and was finished in 1764. The palace is on the west side of Madrid, and occupies high ground from which it overlooks the city. To the south of the palace and adjoining it is the Armory, containing what is probably the finest collection of weapons and armor in the world. The interior of the palace contains many wonderful bits of architecture, among them the grand staircase, the throne room, and the royal chapel.

With its many trees European Madras is a dense green, rolling away to the south and inland until it is lost in the paler hues of the fields. Many imposing government and college buildings and Fort St. George, the original settlement, are in this quarter, set down among colonnades of red-berried banyan trees and thick groves of dipping palms. With several missionary institutions, Madras University, the Presidency College, and special schools of art and the professions, Madras is educationally the first city of India. As the capital of the Madras presidency, it administers a population of more than one-third that of the United States living in an area 7,000 square miles smaller than California.

The weaving of cotton on hand-looms is still an industry of large proportion in and near Madras. The popular cloth we know as "madras" was first made in a village not far away. The water-borne trade of Madras, in small coasting steamers and across the Bay of Bengal to Rangoon, is very important, in spite of the fact that instead of a harbor Madras has only an open roadstead inadequately protected by two breakwaters and so dangerous that when warning comes of the approach of one of the terrible monsoon storms frequent on this coast, all shipping flees to the open sea for safety. Teak, sandalwood, rice, sorghum, coffee, and iron and manganese ores are exported. Population of the city of Madras, about 520,000.

MADRID', SPAIN. When Philip II made Madrid his capital and "only court," in 1560, he chose what was then an unimportant town chiefly because of its central position and perhaps also because his father Charles V had found its bracing climate healthful. Foreign visitors, however, coming from the pleasant south of Spain to a city lying on a plateau 2,100 feet above the sea—unprotected from the sun in summer or the icy winds that blow from snowclad peaks in winter, without countryside and without suburbs, may be tempted to think that "the king who never smiled" chose it mainly for its dreariness. And when they are taken out to Philip's summer palace, the Escorial, 27 miles away, their opinion is confirmed. This, as its name indicates, stands on the "cinders" of an old iron mine. It is a monastery, a church, and the burying place of the Spanish kings as well as a palace. Its unusual shape has led to the fanciful explanation that it is fashioned on the lines of the gridiron on which St. Lawrence was martyred, the courts representing the interstices of the bars, the towers at the corners the legs, and the palace itself the handle.

Although Madrid, which is believed to date from Roman times, was a Moorish outpost in the 10th century and had some 30,000 people at the time Philip made it his capital, it has not the historic pictur-

esqueness of other Spanish cities in whose building the Moors played a principal part. What one sees of it now is scarcely older than Boston, and has less quaintness of appearance. It represents the new Spain rather than the old, with its wide streets and boulevards, its well built houses and public buildings, and the splendid bridges that span the meager trickle of the Manzanares. It is a standing pleasantry with the Spaniards themselves that these bridges should be sold and the proceeds spent to buy water for the river.

The city centers about the plaza or open space where the Gate of the Sun stood in medieval days. About this are hotels, cafés, and government buildings, and from it radiate the ten most important streets; and here start the trolley cars that take you everywhere. The most exciting season for Madrid is of course when the "Cortes" or legislature is in session, but all the year round governmental activities connected with the various ministries and the royal palace go on.



MAETERLINCK
Belgium's Master Playwright and Essayist

The city is also the chief educational center of Spain with its famous old university which has on the average more than 5,000 students. The International Institute for Girls, established by an American woman, is perhaps the only school in Spain where girls can get a taste of the education that girls receive in Anglo-Saxon countries. Madrid also possesses the greatest picture gallery in the world, with the exception of the Louvre in Paris. Besides having the most important collection of paintings by the Spanish masters Velasquez and Goya, it contains Raphaels, Titians, and Tintorettos that are rivalled only in Italy, and Van Dycks, Rubens, Teniers, and works by other Flemish painters scarcely to be equaled elsewhere.

Madrid is the railway center of Spain, and its industries, though still comparatively unimportant, have developed greatly since 1890. Manufactures of leather, tobacco, chocolate, shoes, furniture, carpets, glassware, and many other products are constantly increasing. There have been many strikes and labor demonstrations. Population, about 650,000.

MAETERLINCK (*mā'tēr-lĭnk*), MAURICE (born 1862). There are some people who think that the world is made solely for man's use and pleasure; but the Belgian playwright and essayist, Maurice Maeterlinck, sees a soul in all things. He has just as many wise thoughts when he watches his bees, flowers, and dogs as he has when he tells the story of a wicked king.

Maeterlinck's life, for the most part, has been calm and uneventful, and spent in quiet places. He was born in Ghent, Belgium, and was educated for the law. He became interested while at college in the newer French verse through his acquaintance with Verhaeren, the distinguished Belgian poet. Six months in Paris among the younger literary men then turned Maeterlinck's thoughts forever from the bar. In 1889 he published his first play 'La Princesse Maleine'. In it a poor little princess moves through a series of strange happenings, half-expressed fears, and warnings, to an unhappy death. There is an air of sweet unreality about the play; the characters speak simply and repeat their speeches again and again. The critics at first made fun of the work—that is, most of them, though some hailed Maeterlinck as "the Belgian Shakespeare."

Maeterlinck went on writing in spite of ridicule. Soon people began to see that these plays, which at first some thought so childishly simple, had an elusive beauty of their own, and were full of subtle suggestions of deeper meaning. The truth is that Maeterlinck is more interested in the ideas behind his plays than in their lifelike qualities. He is a man of deep thoughts which he seeks to embody in his plays. These thoughts are not rules for men to live by, nor laws for the world to follow, but fleeting ideas, hopes, beliefs which come unbidden to people and yet come so clearly that they cannot help trusting them. Men do not tell truth best when they are talking, he believes, but when they are silent—which is everyone's experience, if he stops to think of it.

These thoughts Maeterlinck expresses clearly and directly in his books of essays. 'The Treasure of the Humble' is the simplest of all of these. In his gentle quiet way he pleads for tolerance for all beings, for understanding, which will come to all of us if we hold ourselves ready to receive it. His sympathy for women and children is beautiful.

To understand his great play 'The Blue Bird', one should read the essays first, because the play is what someone has called a dramatization of 'The Treasure of the Humble'. It has been compared to Barrie's 'Peter Pan'. Indeed the two plays have much in common, but there is a difference. Barrie's play has all of the tenderness and simplicity of 'The Blue Bird' and surpasses it in humor. What it does not possess is the suggestion of deeper meanings which underlies every one of Maeterlinck's pages, and shines through the speeches.

The following are Maeterlinck's chief works: *Plays*—'La Princesse Maleine' (1889); 'Les Aveugles' (The Blind), 1890; 'Pelléas et Mélisande' (1892); 'Soeur Béatrice' (Sister Beatrice), 1899; 'L'Oiseau bleu' (The Blue Bird), 1909. *Essays*—'Le Trésor des humbles' (The Treasure of the Humble), 1896; 'La Vie des abeilles' (The Life of the Bees), 1901; 'La Mort' (Death), 1913.

contained in the Easy Reference Fact-Index at the end of this work



" Light was sure that the Blue Bird was hidden in the dreadful Place of Night. Tylette the Cat . . . was a great friend of Night and knew all her dark secrets. So he went ahead and warned Night that the children were coming. Night tried to frighten them with stories of the Fears and Terrors, Diseases, Troubles, and Ghosts that lived behind great doors in her caverns. But Tyltyl was a brave boy and Tylo the Dog was brave. . . . One after another Tyltyl opened the doors. The last and biggest of all he pushed wide. The vast cavern was flooded with moonlight and filled with birds of the Moon . . . . millions of them, as blue as the sky!"

For any subject not found in its alphabetical place see information



STORY *of the* BLUEBIRD

IT WAS the happiest evening in the year! You know what *that* is. Christmas Eve! Tyltyl and his little sister Mytyl should have been fast asleep. Mummy Tyl had tucked them into their beds and turned out the lamp. But the rich children who lived in the Big House across the way were having a party. Gay music could be heard, and a thin line of light shone in around the wooden shutters which closed the windows.

Tyltyl and Mytyl jumped out of bed. They climbed on a stool and opened a shutter to see. There was a sparkling Christmas tree. Little boys and girls dressed like fairy princes and princesses were dancing around it. A big table was loaded with pink and white candies, creams, and frosted cakes.

"Oh, how lovely! Oh, how lovely!" cried dear little Mytyl, clapping her hands with delight. Tyltyl and Mytyl were children of Daddy Tyl, a poor woodcutter. They had not been invited to the party, but they were not envious. It made them happy just to look and listen. They danced merrily around their small, dark room and pretended that they had some of the frosted cakes to eat.

A sudden knocking at the door made them jump. Before they could run to open it the latch was lifted. The funniest little old woman, in a bright green dress and red cap, hurried in. She was bent nearly double and leaned on a cane. Her nose and chin almost met over her puckered mouth. Bright mouse-like eyes peered from under her shaggy brows. She might be a witch or a cross old fairy.

"Have you the Bird that is Blue?" she asked impatiently. "My little girl is sick. Nothing will make her well but the Blue Bird."

Now Tyltyl had a turtle dove in a cage, but he wouldn't part with his pet for anything. Besides it was gray.

Tyltyl and the Wonderworking Diamond

"Well, then, you'll have to go in search of the Blue Bird," said the funny little old woman. She gave Tyltyl a bright green hat, with a magic diamond button on it. "Turn the diamond," she ordered.

Tyltyl put on the hat and turned the diamond. Instantly the poor little dark room grew big and bright and splendid.

"Oh how lovely!" cried dear little Mytyl.

"It's just the same as it always was, only you couldn't really see it," said the fairy, for the funny little woman had turned into the beautiful Fairy Bèrylune.

Then the clock door flew open and all the laughing hours danced out. The crusty brown soul of Mummy Tyl's good bread hopped from the pan. The soul of sugar appeared as a polite gentleman who broke off his candy fingers and handed them to the children, the soul of milk as a pale maiden. Water was a dripping green lady, and fire a flame-colored, hot-tempered man. Light, a dazzling rainbow sort of angel lady, streamed from the lamp. Last of all, Tylette the Cat found his soul and turned into a very polite but rather critical and unfriendly person with a cat face. And Tylo the Dog became a noisy loving dog-boy. He nearly went out of his wits with happiness when he could speak to his little master.

"My little god, I love you, I love you, I love you!" he cried.

The fairy Bèrylune smiled at the surprised and delighted children. "Now you see all the good things in your home as they really are. But hurry! You must find the Blue Bird before morning. We can go out by the door or the window, just as you please."

Off to Hunt for the Blue Bird!

It was much more exciting to whisk out through the window. In a moment they were off, through the white and frosty air of Christmas Eve, to the palace of the Fairy Bèrylune. There they were dressed like fairies, or like people and animals in story books. Tylette the Cat was dressed as Puss in Boots.

Everybody but Tylette the Cat wanted the children to find the Blue Bird. When they were going through the forest he called the trees and animals together.

"If Tyltyl and Mytyl find the Blue Bird, then men will know all our secrets. They will have power over us, and take away our liberty. Let us kill the children," he advised.

"No!" snapped Tylo the Dog. "I will guard my

master and his good little sister with my life."

"And I will guard them, too," said Light. "While I shine around them danger cannot come near."

So Light and Tylo the Dog went everywhere with Tyltyl and Mytyl. They had many adventures, but nothing harmed them. The Fairy Bèrylune thought the Blue Bird might be in the Land of Memory. The children went there; and whom do you think they found? Why, their grandfather and grandmother, Gaffer Tyl and Granny Tyl, and seven little brothers and sisters who had died and gone to heaven.

They weren't changed at all! They were all fast asleep by the door of a dear little brown cottage; but they woke up at once. "We just went to sleep, but we always wake up when our loved ones on earth think of us, and have a fine visit with them," said Granny Tyl.

But this Blue Bird Turned Black!

They had a lovely time, talking and playing and laughing, and eating the good old-fashioned dinner that Granny Tyl cooked. They were all so happy that the black bird which Gaffer Tyl had in a cage turned blue. He gave it to Tyltyl and the children hurried away with it to the Fairy Bèrylune. But when they had left the misty Land of Memory behind the bird turned black again.



"The children went to the Land of Memory; and whom do you think they found? Why, their grandfather and grandmother, Gaffer Tyl and Granny Tyl, and seven little brothers and sisters who had died and gone to heaven. They were all fast asleep by the door of a dear little brown cottage; but they woke up at once."

Light was sure that the Blue Bird was hidden in the dreadful Palace of Night. Tylette the Cat overheard her. He was a great friend of Night and knew all her dark secrets. So he went on ahead and warned Night that the children were coming. Night tried to frighten them with stories of the Fears and Terrors, Diseases, Troubles, and Ghosts that lived behind great doors in her dark caverns.

But Tyltyl was a brave boy, and Tylo the Dog was brave; and Light stood outside waiting for them, for she was not allowed to enter the Palace of Night. One after another, Tyltyl opened the doors, peeped in, and clapped them shut again. The last and biggest door of all he pushed wide. For the vast cavern was flooded with moonlight and filled with birds of the Moon. There were millions of them, as blue as the sky!

The real Blue Bird, who could live in the sunlight, was there, perched high on a ray of light. But how was Tyltyl to know that, when it looked just like the others? He gathered his arms full of birds and they all hurried away through the brightening dawn to the Fairy Bèrylune. When the first ray of the morning sun struck the blue birds they turned gray and died.

Tyltyl and Mytyl were so disappointed that they nearly cried. Then Light happened to think that there must be a Blue Bird in the Land of Unborn Children. They found millions of tiny babies waiting to be born. Those who were all ready for the journey to the earth, with their little boxes packed with talents, good luck, gold, measles, whooping-cough, sweet tempers, or odds and ends, hurried onto a ship at dawn and sailed away. Tyltyl and Mytyl were listening to the sweet singing of the mothers on earth as they came to greet their new babies, when Light flew past.

"I have the Blue Bird. Turn the diamond. Time is after us and we must fly to escape."

And There was the Blue Bird at Home!

In a twinkling they were at home, in the woodcutter's poor little cottage. Light was gone, and Fairy Bèrylune. The hours trooped back into the clock. The souls of things took their old forms. Tylette the Cat curled up on the warm hearth and went to sleep. Only the heart of Tylo the Dog was nearly broken because he could never speak to his little master again.

"Well, well, sleepy heads, wake up! Merry Christmas!"

Tyltyl and Mytyl sat up in their beds and blinked their eyes. Daddy Tyl and Mummy Tyl were laughing at them for being so hard to awaken. Tyltyl flung his arms around the neck of Tylo the Dog, who licked his face.

"Oh, how lovely!" cried little Mytyl. "How nice it is to be home. It's so big and bright and beautiful. How good the bread and milk and sugar are. The water is so cold and clear, and the fire so warm and bright. And the clock is full of lovely hours to play with."

The children said and did such queer things and were so wildly happy that Daddy and Mummy Tyl thought they were out of their heads. When Madame Berlingot, a funny little old neighbor woman, who was so bent that she walked with a cane, came in, she told them that her little girl was sick.

"Fairy Bèrylune, Light has the Blue Bird, but your little girl can have my gray dove," said Tyltyl.

"Why, what is the child talking about? I'm not a fairy."

But Mytyl chuckled, and Tyltyl took down the cage. *The dove had turned blue!*

"Take it! It will make your little girl well!"

In a moment she was back. A miracle had happened. The little girl was well and strong and happy. For a moment the Blue Bird nestled in her arms. Then in a flash it was gone.

Tyltyl and Mytyl told me to ask you if you ever find the Blue Bird to please send it back, for they need it for their happiness. But if you do return it they would be sure to give it away again to the first person who asked for it.

And where do you think you should look for the Blue Bird?

Adapted from the story of 'The Blue Bird' by Maurice Maeterlinck, by permission of and special arrangement with M. Maeterlinck and his publishers, Messrs. Methuen & Co., Ltd., holders of the English copyright, and Dodd, Mead & Co., holders of the American copyright.

MAGEL'LAN, FERDINAND (FERNÃO DE MAGALHÃES) (1480?–1521). "The ocean! The great western ocean!" shouted the Spanish seamen, as their cannon saluted the mighty Pacific for which they had been searching many weary months. "If we live we shall yet discover the new way to the Islands of Spices!"

This is the dauntless spirit shown by that Portuguese mariner who discovered the Strait of Magellan, and who was not only the first European navigator to sail across the Pacific Ocean, but the first person also to discover a route over which ships could sail a complete circle around the world.

THE VOYAGES THAT PROVED THE WORLD ROUND



Magellan started the first voyage around the world, but he did not live to see the end of his work. He was killed by natives in the island of Mactan, Philippines, and the voyage was concluded by his successor Elcano. Several decades later Drake performed the same feat for the English.

"Thank God our Lord!" exclaimed Magellan, their captain. "It is true, Señores, that we have lost two vessels, that our provisions are wasted, and that we may have many more hardships yet to endure. But even if we are reduced to eating the leather on our ships' yards, we will go on!"

Magellan, the son of a Portuguese nobleman, early served in the Indies and Morocco with distinction. Believing his king had not justly rewarded his services, he renounced his nationality and offered to serve Charles V of Spain. This ruler, remembering the discoveries of Columbus and other bold sailors,

finally accepted Magellan's proposal, and on Aug. 10, 1519, the latter set sail from Seville in command of five small vessels. Across the Atlantic and down the coast of South America he sailed until very cold and stormy weather forced him to seek winter quarters. A mutiny was put down by force.

Sailing on again in the spring (which came in September in the Southern Hemisphere), Magellan's fleet rounded a promontory and on October 21 sighted what he guessed to be the sought-for strait. Two ships went ahead and reported that the strait led to an ocean beyond; so the fleet proceeded. The "ocean" proved to be only a large bay in the strait; but at a council held with his navigators Magellan declared his purpose of going on.

For over a month he battled his way through this stormy 360-mile passage. One vessel was wrecked and another stole away and sailed back to Spain; but still Magellan persevered. On Nov. 28, 1520, he reached the ocean that Balboa discovered seven years before, and which Magellan now—because it looked so calm—named the Pacific.

AN OLD PORTRAIT OF MAGELLAN



This drawing of the great navigator was made by a man of his own time. It shows him working with the quaint nautical instruments of the period, but the artist used his fancy freely in drawing the ship.

At first the voyage on the Pacific went well, save for monotony. One of the sources of amusement was a Patagonian, whom Magellan had kidnapped with the idea of exhibiting him in Spain; and the chronicler of the voyage, an Italian named Antonio Pigafetta, even made progress in setting down the Patagonian language.

But after a month of sailing, terrible hardships assailed the fleet. The provisions ran low, and rats and leather were choice foods. The drinking water turned thick and yellow, and dozens died of scurvy. In all, the fleet sailed 93 days before discovering Guam of the Ladrones, and a week later the Philippines. He established friendly relations with the treacherous King of Cebu who professed Christianity in order to win the help of Magellan. The great navigator, who was induced to undertake an expedition to conquer the neighboring island of Mactan for the Catholic faith and the King of Cebu, was killed in a fight with the natives, April 27, 1521. The King of Cebu afterwards got into his power several of the explorer's most prominent men and murdered them. The survivors burned one of the three remaining vessels and sailed to the Moluccas, or Spice Islands. Another vessel, becoming leaky, had to be abandoned.

The last remaining vessel, laden with spices, at last rounded the Cape of Good Hope and in melancholy triumph dropped anchor in the harbor of Seville, Sept. 9, 1522. It had circumnavigated the globe, but so too had the dead commander, for on a previous expedition he had gone eastward to 130 degrees, and when he fell he was in 124 degrees west longitude. In the history of discovery no name ranks higher than that of Magellan. He had done what Columbus set out to do—he had sailed westward to the Spice Islands, proving beyond question that the earth is round, and that it is possible to reach the east by sailing west. He opened the Pacific Ocean to the civilized world. John Fiske, the American historian, says: "The voyage thus ended was doubtless the greatest feat of navigation that has ever been performed, and nothing can be imagined that would surpass it except a journey to some other planet."

For any subject not found in its alphabetical place see information

CHARMS, SPELLS, *and* MAGIC INCANTATIONS



EVERY child knows wonderful stories of magic. Life would be dull indeed, if elves and fairies, giants and dwarfs, ogres and dragons were done away with. How should we see the beauties of Bagdad without the magic carpet, or the glitter of the robbers' cave without Ali Baba's "open sesame"? What would become of Aladdin without his wonderful lamp, or of Jack without his beanstalk? What a gap would be left in King Arthur's court if Merlin, the great magician, were removed! As long as children glory in wonderful heroes and beautiful princesses, in little boys who conquer monsters and little girls who overcome wicked witches, we shall have seven-league boots, magic swords, wishing cups, purses of Fortunatus, mice turned into horses, and all the marvelous feats of fairyland. The literature of all races has been filled with tales of magic, from the 'Arabian Nights' to 'Peter Pan'. But these are fancies to delight a fireside evening. There is an entirely different side to magic, which has played an important part in nearly all pagan religions and which is dealt with in this article.

MAGIC. In primitive days, before science had provided its key to nature, men were surrounded by terrifying mysteries. They could fight their human enemies and overcome wild beasts, but the lightning which killed without warning, the strange diseases which struck men down at their own firesides, the swarms of locusts which devoured their grain, all such unusual disasters appeared to them monstrous and unjust—the products of *magic*.

The difference between magic and religion seems to have been clear even in those days. The general tendency was to believe that their gods ruled in an orderly manner, each looking after his own department and his own people, with perhaps a supreme god over the entire group. The spirits of magic, however, were considered irresponsible and disorderly. They caused accidents and trouble without reason. But the most important thing about them, according to savage belief, was that they could be brought under man's control and used for private purposes.

It is this belief, existing down through the ages, which created the thousands upon thousands of magic practices and superstitions, sometimes secret, sometimes carried on in public, but all with the idea of getting supernatural help against enemies or against the powers of nature. The spirits of magic, instead of being looked upon as gods, were often used to outwit divine authority.

Among the earliest forms of magic are those which rest upon the belief that the fate of an individual may be influenced by getting possession of something which once belonged to him. A lock of hair, nail clippings, a drop of blood might put the person from whom they came completely in the hands of the magician. This is still believed among the natives of the Pacific islands, among the Patagonians of South

America, and even in certain peasant districts of Germany. A bit of clothing stolen from an enemy was also considered a powerful agent of magic. The belief spread to include almost everything which had come in close contact with a man's body, so Australian savages drove sharp stones into a man's footprints to make him go lame.

On the other hand, the weapons or clothing of a man noted for courage may make a hero of the one who seizes them. The claws of a lion will bring the wearer the boldness of the king of beasts, the feathers of the eagle will give swiftness and keenness of eye. These beliefs even affect the food of the savages. Thus the flesh of deer or rabbit may create cowardice, but the meat of the lion, the tiger, the bull, give strength. Cannibalism in part was the outgrowth of such superstition.

Later came the belief that, by imitating the thing or person that he desired to influence, the magician could establish his control. Pretended "rain-makers" almost always sprinkled water, made smoke clouds, used flashes of fire to indicate lightning and wooden clappers to imitate thunder. Stones shaped like vegetables were buried in the soil to make real plants grow. American Indians drew the picture of an antelope on a piece of bark and shot at it with an arrow. If they struck the drawing, it meant that they would be lucky in their hunting.

It was the custom among many peoples to make figures of wax or clay, resembling the persons they wished to injure. Calling them by name, the magicians would thrust pins into the figures, or tear off an arm or leg, or melt them in fire or water; whereupon illness and death accompanied by great pain was supposed to come upon the person indicated. This practice prevailed in Ireland and England for many centuries. It exists also in the *voodoo* rites of certain negro groups in the Southern States today, being inherited from ancient African beliefs. It is from such rites that we get the word "hoodoo."

MAGIC RITES TO CURE ILLNESS



The sick man is lying down with his head in a relative's lap. The "medicine" is in the curved hollow horn lying over the patient's body, and the "witch doctor" is performing incantations to drive away the demons which the natives believe to be the cause of the trouble.

The power of names forms a branch of almost all magic. The name was considered as part of a man and, by pronouncing it under proper circumstances, he could be influenced for good or bad. From this belief grew the custom among many savage tribes of having two names for each individual—a real name, which was kept a careful secret, and an everyday title, through which he could not be influenced magically. Gods and spirits were believed to have special magic names, known only to a chosen few. Uttering these names was supposed to give a man some power over these supernatural beings. In this way grew up the spells and charms which form so large a part in the history of magic.

Charm-words or certain secret sentences called incantations were used for summoning the spirits of the dead, and all the various jinns and genii, goblins and fairies, who would then obey the orders of the one who possessed the secret. The belief in "putting spells on" hated rivals or other enemies existed in all countries and continues among the uneducated today. The theory of the curse is part of such a belief. Certain spells like the Irish *geasa* compelled the person addressed to carry out any reasonable task which might be demanded, under penalty of losing honor and reputation. Other spells, like the *tabu* of the Pacific islands, prohibited certain actions. A dwelling might be tabu, which would forbid anyone entering it under threat of magic punishment. Various animals or fish, fruits and vegetables might become tabu for certain members of a tribe and not for others. This tabu power was often used by native chiefs and priests in place of laws, and it was held in such terror that violations were exceedingly rare.

The word "charm" is also used to describe talismans, amulets, mascots, and any object which is carried to bring good luck. Almost anything may become a charm in this sense. Usually the person discovers the magic properties of the object himself,

THE WILD DANCERS OF QUEENSLAND



These grotesque and terrifying figures are "blackfellows" of Queensland. They are engaged in the "Dance of the Forked Stick," which is supposed to bring anything the tribe desires greatly, from rain to victory over enemies. During such ceremonies it is not unusual for the dancers to become so frenzied with excitement that they thrust their feet into the fire apparently without feeling it. At other times they fall rigid to the ground, and lie unconscious for hours.

contained in the Easy Reference Fact-Index at the end of this work

and while it may be a charm for him, it is often supposed to bring bad luck to any other person. The most general use of talismans and amulets is to guard against the "evil eye," the fear of which exists in one form or another in almost all parts of the world. Certain persons are believed to have this evil eye and to bring disaster to anything they gaze at, unless proper magic protection is provided.

When a charm is believed to be not merely an instrument of magic but the actual dwelling place of a certain spirit, it is called a "fetish." The worship of fetishes is usually regarded as a form of religion, but it has many of the characteristics of ordinary magic. Fetishism plays a large part in the voodoo practices mentioned above.

While most forms of magic are based on the belief that evil spirits are particularly numerous and likely to injure mankind, there arises also a belief in good spirits. Along these lines, the practice of magic came to be divided into black magic and white magic; the former being used to do harm, the latter to combat this harm and do good instead.

THE WITCH DOCTOR'S "WATCH DOG"



The African witch doctor is away, and he has set up this grotesque image before his door. He has no fear that burglars will visit his establishment during his absence, for no native would be foolhardy enough to brave the mighty powers which he believes this image possesses.

The special magician or sorcerer has existed wherever a belief in magic prevailed. Under the name of necromancers, wizards, witches, conjurors, medicine-men, soothsayers, diviners, and a hundred other titles, they posed as persons who had unusual powers over the spirit world, could foretell the future or read the secrets of the past. They were everywhere regarded by the people with fearful respect. In Christian countries persons suspected of dealing with the powers of evil were prosecuted severely (*see* Witchcraft). But many of their practices were regarded as beneficial, even in Europe, in the Middle Ages and later. Studies in magic frequently led to important scientific discoveries, for the sorcerers in contriving their magic philters and other drugs made wide researches in chemistry, while those who studied the influence of the stars on human life learned many a valuable fact about astronomy.

In common practice, however, their so-called skill was directed toward interpreting dreams, getting information about the future from their "familiar" spirits, and, in almost all cases, deceiving a superstitious public for their own personal profit. Among the intelligent, their fraud was usually suspected, and it was the Roman Cato who "wondered how one diviner could meet another on the street without laughing."

While modern man prides himself on having thrown off all such superstitions, remnants of magical belief are found even among fairly intelligent people, and many of these are regarded seriously. Under this head come all the delusions about broken mirrors, walking under ladders, the number 13, Friday, lucky coins, spilling salt, wish-bones, black cats, opals, and a thousand other things that are supposed to bring good luck or bad luck. Medical superstitions also remain too numerous to mention. Any almanac will give a list of zodiac signs which are believed to govern the planting of crops, the treatment of farm animals, and to perform other functions equally magical, even to influencing the character and fate of those born under them.

In place of the old magician, we have today the fortune teller, the clairvoyant, the crystal-gazer, the palm-reader, while many of the practices of the spiritualistic mediums, and such contrivances as the ouija board are looked upon by most scientists as relics of the magic arts.

Many of the tricks of the old conjurers, however, with modern improvements are now used purely as private or theatrical entertainments. The practice of sleight of hand or legerdemain, by which it is proved that "the hand is quicker than the eye," is inherited from the tricks of the magicians; but no longer does it suggest spirit influence to the person who has read one of the many books on parlor magic. By using electrical contrivances and other modern mechanical devices, the "magician" of today is indeed able to produce results far more marvelous than the ancient sorcerers. The modern art of conjuring dates from Robert Houdin, who lived in the middle of the 19th century. It depends chiefly on two factors, the substitution of one article for another and optical illusions. For the purpose of protecting their trade secrets, the theatrical magicians of the United States are organized into a society, whose members alone have the privilege of purchasing many of the mechanical contrivances used in professional exhibitions. But the books on the subject are enough to teach the amateur the fundamentals of parlor magic.

MAGNA CARTA. "Why do they not ask for my kingdom? I will never grant such liberties as will make me a slave!" Such was the angry answer of tyrannical King John of England to the first demand of his barons for a charter of reforms.

His tyranny, his wickedness, and his weaknesses had united against him all classes of his kingdom—nobles, churchmen, and townsmen. And while he was waging a losing war on the Continent, seeking to recover his French dominions, the leading barons of England had secretly met together and sworn to compel the king to respect the rights of his subjects, as provided by previous law and custom.

In various ways John sought to break up the forces that confronted him, but even his assumption of the Crusader's cross was in vain. On June 15, in the year 1215, he at last met the nobles "between Staines and Windsor, in a meadow which is called Runnymeade," on the Thames River. Deserted by all but a handful of personal followers, he was forced to affix his seal to the Great Charter—called Magna Carta in Latin, the language in which it was written. In every great controversy between the crown and the representatives of the nation since that time this immortal document has been invoked and today it is still regarded as the chief bulwark and defense of men of English speech everywhere against tyranny and arbitrary power.

It is said that when King John granted the Great Charter he smiled and spoke pleasantly to the lords about him, but that when he reached his own chamber he threw himself on the floor in a mad rage, gnashing his teeth and biting the rushes with which the floor was strewn.

Since that day the Charter has been confirmed repeatedly by succeeding kings of England, and has become a part of English law, and the foundation of the constitution of every English-speaking nation.

Historical students today agree that the barons were not so unselfish as once was thought. They were chiefly interested in securing their own rights and they paid little attention to the rights of the common people or the constitutional liberties of the realm as a whole. Thus the charter in its 63 "chapters" or sections deals for the most part with feudal rights and duties which became obsolete when feudalism died out. Its chief permanent importance is that it established the principle that "the king is below the law" and not above it. In later days new and more liberal meanings were read into some of its provisions, and so all classes came to reap the benefits which the barons won for themselves. But modern writers find in it no such guarantees of jury trial or right of parliamentary taxation as were found in the Charter by 17th and 18th century legal writers.

Some of the most important provisions of the Great Charter are these:

"No free man shall be arrested or detained in prison, or deprived of his freehold, or outlawed or banished, or in any way molested; and we will not set forth against him, or send against him, unless by the lawful judgment of his peers and by the law of the land."

"To no one will we sell, to no one will we refuse, or delay, right or justice."

MAGNE'SIUM. Anyone who has been in flashlight pictures knows that flashlight powder, which contains the metal magnesium, burns with an intense white light. Magnesium is a widely distributed metallic element but is never found in the free state. It is present in many minerals, such as asbestos and meerschaum. It exists in mineral waters and in the sea as sulphate and as chloride. The metal was first discovered by Sir Humphry Davy in 1808. For a long time manufacture was on a small scale; but now it is made in large quantities by fusing, distilling, and processing certain compounds, or by passing electricity through certain chemical salts. Magnesium has a silver white color, which is tarnished by moist air. It is very light, but can be hammered, rolled, polished, and filed. "Milk of magnesia" is a mild alkali (magnesium hydroxide), used to neutralize acids—for instance, as a mouth wash.

MAGNET. When you visit a big modern steel plant, you may see hanging by heavy chains from overhead tracks one of the strangest lifting instruments in the world. It is a huge metal disk with a number of short thick iron rods projecting from the bottom. Around each of these rods is wound a heavy layer of insulated wire, and big cables bring a powerful electric current to the machine.

If you observe it at work you may see it suddenly let down upon a pile of pig iron. Nothing moves; it has no teeth or jaws or grappling hooks; but as it is hoisted up again a dozen great pigs of iron are hanging to it. The crane carrying the machine now travels along the overhead runway to the furnace platform, and there the pigs drop off as if by miracle.

This machine is simply a powerful electromagnet, which when once magnetized has the same general properties as the small "horseshoe" magnet which we see for sale in toy stores everywhere.

At a trial made, a steel gondola-car containing 109,000 pounds of pig iron was unloaded in two hours and five minutes, one man, the crane operator, doing the work. Scrap iron, which is difficult and tedious to handle by hand, is easily and rapidly picked up by the electromagnet, unloaded from cars, and placed where wanted. A safe weighing seven or eight tons is picked up and by aid of a crane carried from one shop to another. In a hundred similar ways the electromagnet is made to accomplish feats which seem little less than marvelous, and which result in large economy of labor and time.

It has been known for many centuries that an iron ore which mineralogists call "lodestone" or "magnetite" has the remarkable property of attracting iron filings. A body which possesses this property is said to be "magnetized," and is called a "magnet." Certain parts of a magnetized body attract iron filings more strongly than do others. These parts are called "magnetic poles."

A piece of iron can be magnetized by rubbing it over a piece of lodestone; and if the iron have a long slender shape it will have a pole at each end, called for convenience the north and south poles. Each of these poles will attract iron equally well, but if two such magnets be brought together it will be found that, although the north pole of one will strongly attract the south pole of the other, if two north poles or two south poles are brought together they repel each other with a corresponding violence.

THE "SKULL CRACKER" AT WORK



A powerful lifting magnet is here shown raising a huge piece of metal weighing 12,000 pounds, known in the slang of the shop as a "skull cracker." The "skull cracker" is used to break up metal castings. The electromagnet lifts it high above the castings, then the electric current is turned off, and the great mass falls with shattering force.

The first profound student of magnetism was Dr. William Gilbert (1540–1603), who was the leading man of science in England during the reign of Queen Elizabeth. He was led to conclude from the manner in which small magnets behave at various points on the earth's surface that the earth itself is a gigantic magnet. The mariner's compass, which is a magnet delicately suspended so it can revolve easily, was made possible by this magnetism of the earth (*see* Compass, Magnetic).

Gilbert showed also that when an iron magnet is heated to red heat, it not only ceases to be magnetized, but loses all ability to become magnetized while it remains hot. Red-hot iron behaves, therefore, not as cold unmagnetized iron but as cold brass or glass or zinc or any other non-magnetic substance. This discovery is described by saying that iron loses magnetic quality at red heat.

If to the phenomena already described we add that of magnetic induction we shall have a fairly complete summary of the fundamental facts of magnetism. A piece of unmagnetized iron when brought near a magnet immediately acquires magnetic poles, *i.e.*, it exhibits magnetization as well as magnetic quality. A wire nail held near a strong magnet not only is attracted itself but also acquires the property of attracting other iron nails or iron filings. These wire nails are said to be magnetized by induction.

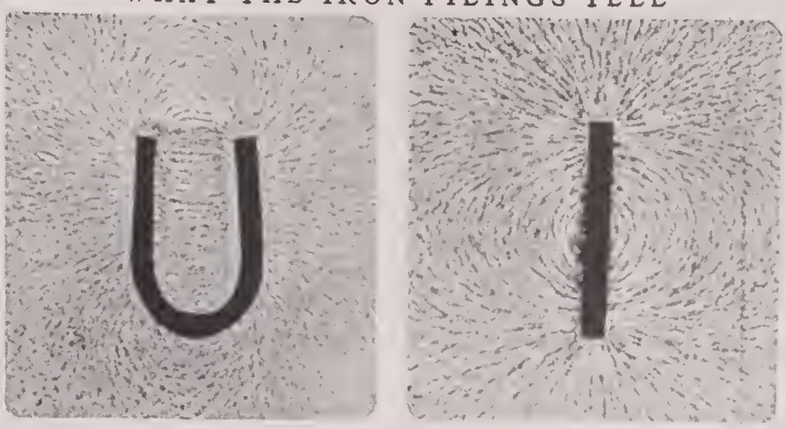
The earth itself will induce magnetism in this way. If we take a rod of soft iron and point it north, dipping the end slightly toward the ground, and then give it a few sharp hammer blows on the other end, we find on bringing it near a delicate compass, that the iron rod has acquired slight magnetic properties.

This will help to explain the "molecular theory" of magnetism. Iron, like all other kinds of matter, is believed to be made up of exceedingly small particles called molecules. Each of the iron molecules is con-

sidered as a tiny natural magnet, but in an ordinary piece of iron these tiny magnets are pointing in every possible direction, and so counteract each other.

Now we place the iron in line with a ready-made magnet like the earth, and by hammering one end of the iron we jar up all the little molecule magnets. This gives them a chance to switch around, so that their north poles all point in one direction and their south poles in the other. Now that they are all working together the whole iron rod becomes a magnet. But as soon as we turn the rod east and west and hammer it again the magnetism disappears. Because steel is harder than iron it becomes magnetized much more slowly, but holds its magnetism much longer, for its molecules cannot switch back and forth so easily.

WHAT THE IRON FILINGS TELL



Two magnets—a horseshoe magnet and a bar magnet—are shown here, each covered with a sheet of glass upon which iron filings have been sprinkled. The filings have arranged themselves in symmetrical patterns, which show us how the lines of magnetic force are exerted from pole to pole.

The electromagnet, which we have seen lifting pigs of iron, is an instance of magnetic induction by an electric current. If electricity flows around a coil of wire inside of which there is an iron core that core becomes a powerful magnet. As soon as the current is shut off, however, the magnetic attraction ceases. That is why the big lifting machine can first pick up the pig iron and then drop it.

This principle of the electromagnet makes possible the dynamo and the electric motor, the telegraph and the telephone. (*See also* Dynamo; Electricity.)

Magnolia. The creamy-white blossoms of the great-flowered magnolia scenting the warm southern air with their intoxicating perfume, make this tree a veritable queen of our parks and gardens. The large glossy evergreen leaves form a fitting setting for the waxy petals and golden cone-shaped heart of the beautiful flowers, which are often eight to twelve inches in diameter. The flowers emerge from their furry brown buds in May and June and are succeeded by conelike fruits which are reddish when ripe. In its natural state this tree attains a height of 70 to 100 feet, having a straight trunk and spreading limbs. It is native of the Southeast, from South Carolina to Louisiana.

MAGNOLIA IN FULL DRESS



Imagine the creamy-white blossoms, the golden cones in the heart of them, the large glossy leaves, and the intoxicating perfume, and you will appreciate this queen of flowerland, the Magnolia.

The laurel magnolia is more widely distributed than the great-flowered species, but neither in size nor beauty can it compare with its magnificent cousin, having small creamy-white flowers which resemble a yellow water lily in shape and size. The leaves are also more diminutive than those of the preceding species and are much lighter in color. The species is native from Massachusetts to Florida and westward to Louisiana. In the more northern regions it is a mere shrub but in the south it sometimes rises to a height of 50 to 60 feet. The cucumber tree, which bears greenish-yellow blossoms, is another American type. It is so named from the fruit, which when green resembles a cucumber; when ripe, however, the cones are dark red in color.

Altogether there are about 20 species of magnolia, native to the Himalayas, India, and other regions in Asia as well as of Europe, northern Africa, and North America. They vary widely in habit and growth, some being evergreen and others deciduous, while the blossoms range from white and light yellow to deep rose and purple. A Chinese species bears blossoms which rank next in beauty and size to those of the great-flowered type of North America. The tree, however, is little more than a shrub. India boasts another species, a large tree towering to a height of 80 to 150 feet and having a large girth. The great showy flowers vary from purest white to deepest rose.

By careful selection and cross-breeding additional beautiful varieties have been produced, which flourish in hothouse, garden, and park. The range of some species has been extended and beautiful specimens may now be found flourishing in regions far separated

from their native haunts; for instance, the great-flowered magnolia is found as far north as Pennsylvania, and Chinese species grace gardens in both England and America. The genus is named for Pierre Magnol, a French botanist of the 17th century.

Scientific name of the great-flowered magnolia, *Magnolia grandiflora*. Bark brownish-gray, with scales of about one inch in length, lying close together. Leaves simple, alternate, evergreen, entire, ovate. Flowers cream-white, with heavy lemon fragrance; 6, 9, or 12 petals. Fruit a reddish conelike pod, about the size of a hen's egg.

MAGPIES, JACKDAWS, AND ROOKS. These noisy birds are a robber-band that, with the jays and ravens, belong to the crow family (*Corvidae*). Magpies are handsome birds, from 16 to 20 inches long, with glossy black and snowwhite plumage, and a long pointed tail. They are found in the Old World and in northwestern America. If encouraged they make friends with human neighbors and are easily tamed. The magpie's constant use of its harsh voice has given rise to the expression "a chattering magpie." It builds a large strong nest, capable of use for several years.

Magpies are not content with stealing bright trinkets and jewelry, for they rob their bird neighbors of eggs and young. What is still worse for their reputation is the complaint of western ranchers that these birds alight on newly branded cattle and feed on the raw flesh of the wound. So, for all his good looks, the magpie is a rather bad sort.

The jackdaw and rook are both Old World birds. The rook, a bit smaller than the crow, has a decided purplish tinge over his plumage. The adult birds shed the face feathers, leaving the skin about the bill bare. They feed entirely on insects and grain. Rooks nest in large communities or rookeries. The winter habits vary; some migrate south and some remain in the same district throughout the year. The jackdaw is found in Europe, Asia, and North Africa. Its nest is built in rock cavities, church towers, and chimneys. It feeds almost entirely on insects. It is easily tamed and makes an interesting pet that can be trained to imitate the human voice.



To look at the white in their clothes you wouldn't think these Magpies belonged to the Crow family, would you? The magpies are not the only members of the crow family that seem to like a little touch of white in their clothes. Jackdaws, for instance, wear white caps and white shirt fronts. The more typical species of magpies have black and white plumage, although many magpies of the Far East have gorgeously colored feathers.

AT HOME!



Jackdaws are not very particular where they build their nests — abandoned rabbit holes, church belfries, holes in rocks. But they become very fond of these nests once they have picked them out, and come back to them year after year.

SOCIETY LIFE IN ROOK TOWN



These are rooks—English rooks—a little group on a dead tree by a wall. In their nests among the old elms of the English estates you will find them by hundreds and by thousands, particularly in the evening when they come to roost.

Scientific name of the American magpie, *Pica hudsonia;* rook, *Corvus frugivorus;* jackdaw, *Corvus monedula.*

MAHOGANY. It was a happy accident which introduced the beautiful wood of the mahogany tree to Europe. In 1595, when Sir Walter Raleigh was in the West Indies, his ship carpenter discovered this wood and used it in repairing the vessel. The wood was greatly admired, but it did not become an article of commerce until the 18th century, when English cabinet makers began to use it for fine furniture. It has since been one of the most highly esteemed woods for fine furniture and interior finishings, because of its beautiful grain and rich reddish-brown color combined with hardness and durability. It is the best of all woods for airplane propellers, and was once much used by the Spaniards for shipbuilding.

Nearly all the true mahogany comes from Honduras, though small supplies are obtained from Santo Domingo and Cuba. The tree is large and slow-growing, often 100 feet high, with an enormous buttressed trunk sometimes 12 feet in diameter. It is now very scarce, being found chiefly in the depths of trackless forests, and the enormous expenditure of money and labor involved in cutting and transportation makes it very costly. The trunks are cut from platforms 12 feet above the ground—a very hazardous undertaking—and the logs are dragged

out of the forest by oxen. A single tree of large size, if of especially beautiful grain, is worth many thousands of dollars. Because of its value most mahogany is used in the form of thin sheets of veneer glued to the surface of cheaper woods.

The true mahogany, *Swietenia mahogani*, belongs to the *Meliaceae* or bead-tree family (so called because the seeds are used as beads). The leaves are pinnately compound, like those of the ash, three to five pairs of leaflets; flowers small, whitish or yellow, in panicles; fruit a hard woody oval capsule. The name mahogany is also given to several unrelated species of trees, whose wood resembles the genuine mahogany in grain and color.

The Mexican or white mahogany is much softer, and lighter in both weight and color. African mahogany, which belongs to the same family as the true mahogany, furnishes a considerable amount of timber. Reddish-brown hardwoods of various species are imported from the Philippines as "Philippine mahogany." In Australia certain kinds of eucalyptus are called mahogany.

"Down East" in the PINE TREE STATE



MAINE. Maine is the child of Massachusetts, of which it was a part until 1820. Perhaps the parental relation explains why Bostonians still talk of going "down to Maine," as "down-easters" from Maine talk of going "up to Boston" or "up to Massachusetts."

Extent.—North to south, 303 miles; east to west, 212 miles. Area, 33,040 square miles (about one-tenth of which is water surface). Population (1920 census), 768,014.

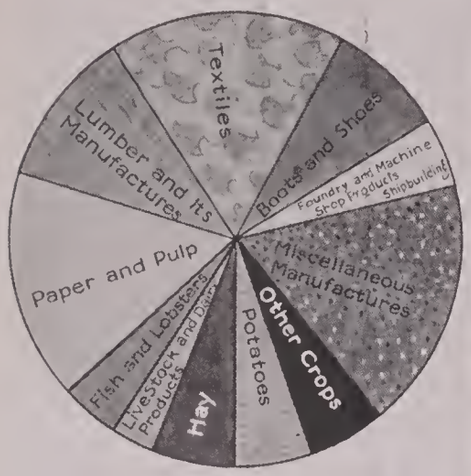
Physical Features.— Hilly surface with scattered mountain peaks (Mt. Katahdin, 5,200 feet). Largest lake, Moosehead. Principal rivers: Kennebec, Androscoggin, and Penobscot.

Principal Products.—Hay, potatoes, oats, sweet corn, apples; cattle and dairy products; herring, lobster, cod, and other fish; granite, limestone and marble, and slate; paper and paper pulp, lumber and timber products, textiles, shoes, canned fish, fruits, and vegetables.

Chief Cities.— Portland (about 70,000), Lewiston (32,000), Bangor (26,000), Augusta (capital, 15,000).

Maine today owes little to her parentage and much to her thrifty people and to her rich heritage of picturesque lands and waters. On the southeast are the deep cool waters of the Atlantic, delightful caves and bays, and a much indented and picturesque coast with excellent harbors protected by numerous islands. Covering the greater part of the state are great wooded wilds, splashed with countless lakes and cut by numberless rivers and streams—a woodland where Rhode Island and Connecticut might be placed and lost to the world and to each other. For over half a century people have been coming here for recreation and rest, and the 500,000 pleasure seekers who now visit it each year find the same primitive charm that Thoreau and other tourists found 60 or 70 years ago. Rolling hills and valleys cover most of the surface, with many low bare mountain peaks in the north and west. The solitudes are frequented by big game, the streams are full of fish, and the lakes abound with water fowl. Here and there faint trails wind through the forest, but the rivers and lakes are the chief thoroughfares, just as in the days of the first explorers. Even Indians are not altogether lacking, for a remnant of the once powerful Penobscot tribe remains to act as guides for the tourists. True, you may now and then come upon a limousine or a 20th century hotel; but a few rods away you are in the woods again, and nature is all about you, just as it was in the days before the white race invaded North America.

THE "PINE TREE STATE"—ITS SURFACE, ITS PRODUCTS, ITS RELIGIONS



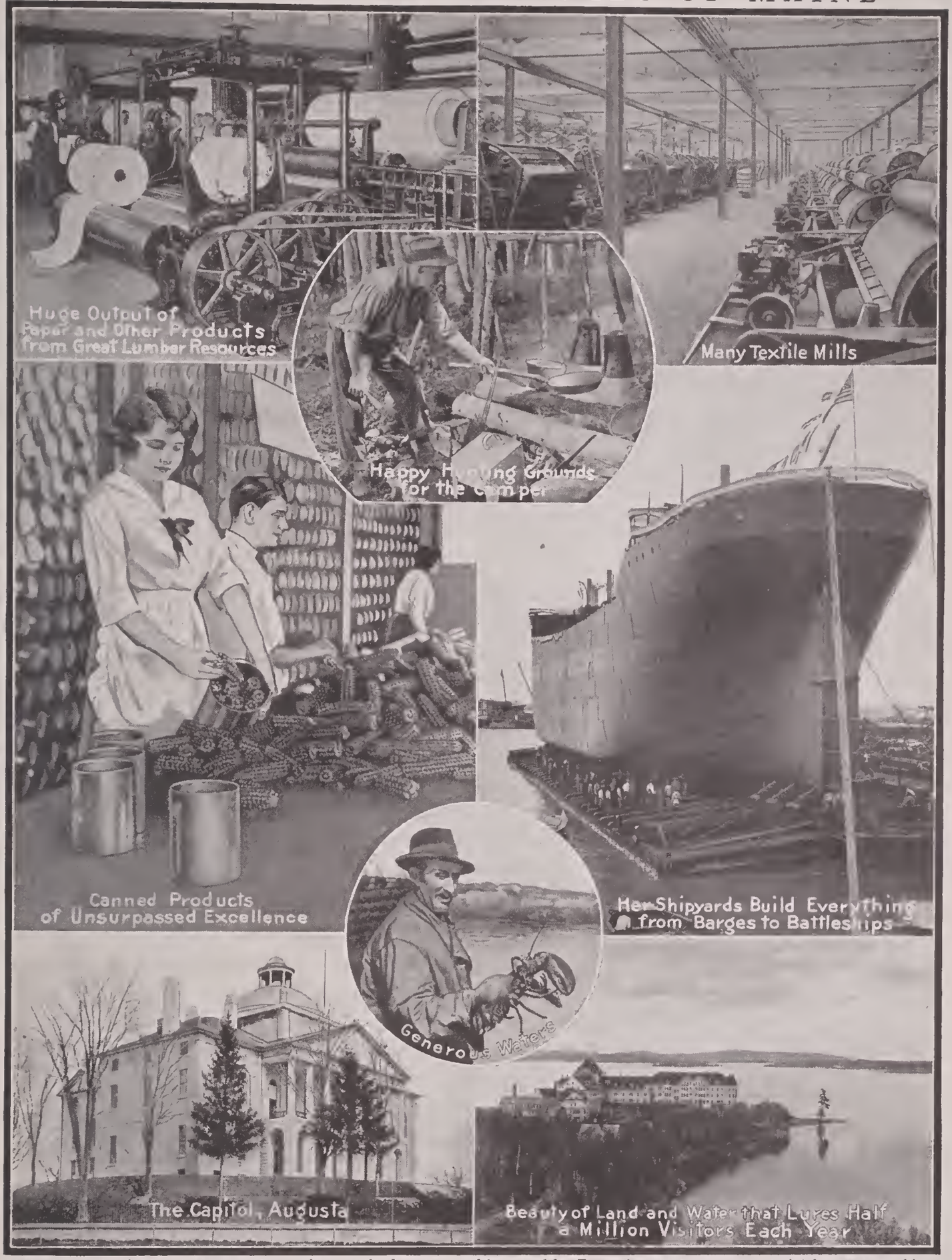


Nor is pleasure all that the wilderness yields. An immense amount of timber is cut from it every year to be floated down the great rivers to the cities and there converted into lumber and wood-pulp. On the Penobscot, Maine's largest river, is Bangor, one of the greatest lumber markets of the North, receiving logs direct from the forest and running its mills by means of the water-power furnished by the falls of the river. At the head of navigation on the Kennebec is Augusta, the capital, using its water-power for paper and cotton mills. The many tall pines that once rose above the other trees of the forest and gave to Maine the name of the Pine Tree State have largely disappeared owing to the demands of commerce; but spruce, the wood most used for paper, exists in large quantities. White birch is utilized in spool factories which produce about 800,000,000 spools annually. The science of forestry is being extensively employed by private corporations to preserve the timber, and replant deforested areas.

Although only about one-third of Maine is free from forests and the soil is ungenerous for the greater part, farming has recently shown phenomenal development in the most northern county—Aroostook. The fame of this section has gone all over the world as a region for the growing of potatoes. Modern methods in cultivation, combined with the unusual adaptability of the soil, not only make the average yield per acre exceptionally large but produce stock unexcelled for either food or seed. Hay, grain, and other crops also grow well in this section. South of the forest region milk and vegetables and fine winter apples are produced for the cities, and immense quantities of apples, squashes, blueberries, and sweet corn are canned and shipped. Maine-packed sugar corn leads in all the markets, and is claimed to excel that of all other states in quality.

Waterfalls and swiftly flowing rivers make Maine rich in natural water-power and have attracted many factories. Chief among them are those producing paper, wood-pulp, and other timber products, cotton and woolen goods, boots and shoes, while canning and preserving are also important industries. Up to 1890 Bath was the chief shipbuilding center of the United States, and nearly half of the ocean vessels

THE HUMMING INDUSTRIES OF MAINE



Maine's woods, fields, streams, and quarries are the keystones of her wealth. From the woods comes material for paper-making, and the streams furnish power for busy industries, including the manufacture of textiles and the preparation of canned goods. The seacoast also supports ship-building and thriving fisheries. Great streams of tourists are attracted to Maine every year by the beauty of its scenery.

contained in the Easy Reference Fact-Index at the end of this work

ON THE CAMPUS OF "OLD BOWDOIN"



"Old Bowdoin" is the affectionate name which its students have given this famous college of Maine since the middle of the last century, and many have testified their affection in more substantial ways. Hubbard Hall, the fine library building in the distance, built in the 17th century Gothic style of architecture, was the gift of General Hubbard of the class of 1857. The Walker Art Building, with the cupola, contains the art treasures of the college, and was erected to the memory of another graduate. Searles Science Hall, the next building on the same side of the quadrangle, was given by Edward F. Searles. The campus covers about forty acres.

of the country came from Maine. With the decline of the use of wooden vessels, however, the industry decreased, and it was not until the World War that Bath came again into prominence. It now builds both wooden and steel ships, including barges, schooners, steamers, and even warships.

The fisheries of Maine rank second among those of the New England states. The lakes and rivers abound with fish in great variety, and lobsters, clams, and mussels are found in large quantities along the coast. Few minerals are found in workable quantities in the old worn-down mountains, but quarrying is an important industry. Maine ranks high among the states in the output of granite, and marble, limestone, and slate are produced in considerable amounts. The finest of tourmalines are found in the state.

The Childhood Home of Longfellow

No city on the coast is more closely associated with Longfellow than Portland, the city of his birth and childhood. The largest and wealthiest city in the state, it is also one of the most beautiful in all New England. Its many densely shaded avenues have earned for it the title of the Forest City, and it is beautifully situated on a peninsula extending into the island-dotted Casco Bay. Recalling his childhood, Longfellow says:

> I remember the black wharves and the slips,
> And the sea-tides tossing free;
> And the Spanish sailors with bearded lips
> And the beauty and mystery of the ships
> And the magic of the sea.

Great steamers and graceful yachts have taken the place of the schooners and market boats that Longfellow knew, and busy factories have sprung up in the city of the "black wharves."

Lewiston is the second city in size. Although situated on the Androscoggin River in the midst of a fertile agricultural district, it is essentially a manufacturing city, producing chiefly cotton cloth. On the same river is Brunswick, the home of Bowdoin College, where Longfellow studied and was for some years a professor. Hawthorne was another famous Bowdoin graduate. At Orono is the University of Maine, one of the two state universities in New England. Colby College at Waterville is also well known.

The Climate and the Summer Resorts

The climate is cooler than might be expected from the latitude, due to North Atlantic currents, but the cold of winter has a constancy which makes it less severely felt than the changing temperatures of more southern sections. The summer heat is tempered by sea breezes and cool winds from the north, attracting many summer visitors Notable among the outing places is Mount Desert Island, upon which is situated the world-famed Bar Harbor, a community of magnificent estates, with stimulating air and incomparable scenery. Here, too, is the Lafayette National Park, the only national park in any of the eastern states. It includes most of the island mountains, some of which rise almost out of the ocean itself to a height of more than 1,500 feet. Near New Hampshire are the beautiful Rangeley Lakes, the fisherman's paradise, 1,000 feet above sea level; and farther north lies Moosehead Lake, Maine's largest sheet of water.

Various explorers touched upon the coast of Maine in the 16th and early part of the 17th century, and both French and English made settlements and laid claim to the country. A French charter to the area

was given in 1603 and it was included by King James of England in the Plymouth charter of 1606. During the long struggle of the English against the Indians and the French, the country was a battleground. The first organized government was set up in 1636 by an Englishman named Gorges. In 1692 it was definitely included as part of Massachusetts by a new charter given that colony. Henceforth it was governed under the name of the District of Maine until 1820, when it was admitted as a state in the Union.

The boundary on the north had long been a matter of dispute between the United States and Canada. In the treaty at the close of the Revolutionary War the boundaries had been defined in a way that sounded very well on paper, but when it came to marking the line on the land the two countries could not agree, for the St. Croix River named in the treaty proved not to be the true St. Croix. Canadian lumber cutting in the disputed district of the Aroostook River (now in northeastern Maine) threatened serious difficulty, but actual fighting was avoided. The Webster-Ashburton Treaty negotiated in 1842 divided the disputed region almost equally between the two nations, and so ended the dispute. At one time Maine called out the militia and New Brunswick sent two regiments of British regulars. Although no gun was fired, the long-continued quarrel is known as the Aroostook War.

Maintenon, Marquise de (1635–1719). The story of Cinderella is no more thrilling than is that of the Marquise de Maintenon, who, though born in prison, became the wife of the most powerful king in Europe, the brilliant Louis XIV. After a childhood of poverty, during which she was handed around from one person to another, at the age of 16 Francoise d'Aubigne married the deformed but good-hearted poet, Scarron, who offered either to marry her or to pay her entrance fee into a nunnery. At his death she was again left without money, but through the influence of powerful friends she was appointed governess of two sons of Louis XIV.

Her good influence over the king soon became apparent, and before the queen died she declared that she owed it to Madame de Maintenon that, after 20 years of neglect, her husband again treated her with kindness. After her death the king privately married Madame de Maintenon and from then until his death her influence was supreme, though she did not hold the rank of queen. Her advice on political matters was seldom given and was always wrong, but her moral influence purified the scandalous court life at Versailles. Her letters portray her life vividly.

Her greatest service to her country was the founding of Saint-Cyr, a school for the education of poor daughters of the nobility. To it she retired, after the king's death, to spend the last years of her life; and in its choir her body is buried.

Malay Archipelago. The largest group of islands in the world, lying between southeast Asia and Australia. It includes Sumatra, Java, Borneo, Celebes, New Guinea, the Philippines, and many lesser islands. They are known also as the East Indies. The islands are remarkable for the large number of active and extinct volcanoes to be found upon them. Most of them are exceedingly well watered and support a rich tropical vegetation. While the Portuguese were the first to develop the rich island trade in the 16th century, the Dutch soon gained control, and Holland today possesses a large part of the archipelago. (*See* East Indies.)

Malay Peninsula. No human eye has ever seen more than a small fraction of the Malay Peninsula—that long lozenge-shaped arm of land that trails off to the south and southeast from the Indo-Chinese peninsula of Asia. Its whole length of 750 miles is one vast impenetrable jungle, intersected by many streams—the only roadways of the interior.

A MALAY MERCHANT AND HIS FRUIT STAND



This Malay fruit seller's stock in trade consists of pineapples cut into slices which he has thoughtfully covered with a fly screen. This is quite unlike the usual Malay, who is extremely careless about flies and dirt; but in the larger cities the Malays are learning something of the ways of civilized life.

The rich soil, in one of the hottest and dampest climates in the world, is covered with a bewildering tangle of giant trees, creepers, trailing vines, and undergrowth so dense that even the wild beasts travel only in well-worn paths. Ferns and rank grasses hide the soil. This tangle of vegetation harbors myriads of leeches, centipedes, scorpions, wasps and stinging flies, pythons and cobras, ants and mosquitoes, parakeets and other songless birds of brilliant plumage. Smooth black buffaloes with pointed horns, elephants, and tigers are plentiful. There are black

ON THE SUNNY WATER FRONT OF SINGAPORE



The open-air, happy-go-lucky life of the Malay Peninsula has somehow breathed its spirit even into this port, the headquarters of British enterprise in the region. You see it reflected in the low, airy houses, and in the curious native craft plying lazily about. An easy life is really necessary, for the humid air has an average temperature for the year of 80 degrees.

leopards and honey-bears, tapirs, and deer, and the rare Malayan antelope; and the lumbering rhinoceros wallows in noisome swamps with the alligator.

Along the swampy banks of the rivers live the strange and mysterious people called the Malays. The typical Malay is short, thick-set, and well built, with straight black hair, a dark brown complexion, thick nose and lips, and bright intelligent eyes. He is suspicious, courageous, and extravagant; a gossip, a Mohammedan and fatalist, and very superstitious. He is conservative, proud, and fond of his country and his people. He is clever but infinitely lazy. He loves power and place; his soul hankers after honors. He plays at trade sometimes, but almost always fails to make a living at it, because he knows nothing of method or order. His house is untidy, even dirty; but he bathes twice a day and is very fond of gay clothes—especially the soft-toned cotton and silk *sarong* which both men and women wear draped around the waist to make a sort of skirt.



These brown little Malay children are giving a concert. The one on the left is blowing a toy horn, the one on the right is wailing a high note, while the two in the middle are playing a strange instrument made of vibrating bits of bamboo, thrust upright into a chair-shaped frame. You can imagine the noise they're making!

The Malay village is usually a cluster of huts on piles built of bamboo and palm leaves, or sometimes wood and thatch. The houses are never close together, but within sight and call of each other, shaded by tall coconut palms and a few fruit trees—the dark-leaved mangosteen, the mango with its brilliant magenta blossoms, and the durian, that tree of magnificent dimensions which produces the golden spike-studded fruit so liked by the natives. Back of the *kampong* (inclosure) are fields of rice, irregular golden islands of it running back into little valleys, at the foot, perhaps, of the long mountain chains that rise range upon range into the heart of the peninsula. This rice, with the fish they are always catching, forms the staple diet.



You can tell by the hair-dress of a Malay woman whether or not she is married. This is the fashion for wives.

About two-fifths of the population are Malays; but the bone and sinew of the Malay States are the Chinese, who compose another two-fifths of the total and are the laborers, miners, shopkeepers, and contractors, and contribute almost the whole of the revenue. In the mountains are still found about 20,000 of the aboriginal inhabitants—the woolly-haired negroid Semangs, who support themselves by fishing and hunting, and the Sakais, who build their houses in forked trees and formerly obtained all their meat by poisoned darts shot from blow-guns. The Tamils, sent down from southern India to work on the rubber plantations, number around 100,000. Copra, rice, tapioca, coffee, and spices are also important exports.

Politically the peninsula consists of the southern province of Siam, the British crown colony called the Straits Settlements (which includes the islands of Singapore and Penang, and the town and territory of Malacca); the four Federated Malay States (Perak, Selangor, Negri Sembilan, and Pahang), under British protection, and five non-federated Malay States (Johore, Kedah, Perlis, Kelantan, and Trengganu), under British protection since 1909.

For any subject not found in its alphabetical place see information

The city of Singapore, from which the Straits Settlements are administered, is on a small island at the extreme tip of the peninsula. It is a well-built city, founded by the British in 1819, and has an enormous trade owing to its location at the entrance of the Strait of Malacca, the main gateway between the Far East and Europe (*see* Singapore). The Malay Archipelago or East Indies, whose numerous islands stretch eastward for 4,000 miles, is in many senses a continuation of the Malay Peninsula. (*See* East Indies.)

It was not until the 16th century that the Malay Peninsula became known to Europe, through the Portuguese. Then it was sought for its spices, and not until recently has the peninsula become known for its mineral wealth. Today it furnishes more than one-half of the world's supply of tin. Malacca, where the Portuguese founded their spice monopoly, became famous owing to the fact that the trade of the next two centuries between the Arabian Sea and the Indian Ocean converged at this point. The English and Dutch succeeded to the Portuguese trade in the East, and when the Dutch power declined in the 18th century, the English gained the ascendancy. Population of the peninsula, about 2,000,000.



Malay girls marry very young. This little mother is perhaps 14 years old. You'd know she lived in some civilized center from that European "teething ring" the baby is chewing. Notice the mother's curious sandals, held on by a knob that comes up between her toes.

MALT. Barley or other grain that has been artificially germinated or sprouted by moisture and heat is called malt. In the older and simpler method of malting the grain is steeped in cisterns for from 48 to 70 hours at a temperature of about 100° Fahrenheit. It is then spread on the floor in heaps to germinate. About eight days later it is finished by drying in kilns.

Malt is largely used in making malted milk, which is a mixture of powdered milk and powdered malt. It is also used in making invalid and baby foods, for the starch of the grain is started toward digestion in the process of malting; some of it is actually changed into sugar and other products, soluble in water. A solution of malt products, evaporated to thick consistency, looks like brown syrup, and is used in bread-making. Malt is also used by yeast producers as food for the yeast plants. Its former use in the United States for brewing has largely ceased with the enactment of the national prohibition amendment. Malt gains its value from a ferment or enzyme called *diastase* which is developed in the grain during malting. It has the power of converting starches into sugars (*see* Enzymes).

MALTA. In June 1798 Napoleon Bonaparte, while on his way to Egypt, seized without resistance the small island of Malta, in the Mediterranean Sea, which was then ruled by the Knights of Malta—the last of the famous Crusading Orders of the Middle Ages. Three months later a British fleet, aided by Maltese rebels, besieged the garrison of French soldiers left behind by Bonaparte. The garrison held out for two years, but finally surrendered. Thus Great Britain came into possession of that important strategic point, which with Gibraltar gives her today naval control of the Mediterranean. It is now strongly fortified and garrisoned and is considered one of Britain's important naval bases.

Inhabited originally by the ancient Mediterranean race, whose great stone monuments are still visible, Malta was colonized by the Phoenicians perhaps 900 years before the Christian era, and in the 6th century B.C. the Carthaginians ruled there. Then in succession through the centuries came Romans, Byzantine Greeks, Saracens, Normans, and Spaniards, until the Emperor Charles V in 1530 gave the island to the Knights Hospitalers of St. John, who had just been driven out of the island of Rhodes by the Turks. Adopting the title Knights of Malta, they defended themselves against Turkish attack in the famous siege of Malta (1565), and maintained their rule until the surrender to Bonaparte in 1798. The Knights of Malta still exist as an honorary order, with headquarters at Rome.

Malta lies 58 miles south of Sicily and about 180 miles from the African coast. It is an important coaling and naval station, and most of the leading steamship lines of the Mediterranean touch there. The island is only 17 miles long and 9 miles broad, but near by are the smaller islands of Gozo and Comino which make the total area of the British colony 118 square miles.

The climate is temperate, and except for occasional outbreaks of Malta fever, due to a germ found in goat's milk, it is healthful. The country people, who cultivate tiny farms terraced up on the hillsides, are largely descendants of the early Phoenicians and speak a dialect of mixed Phoenician, Arabic, and Latin origin. There is a large admixture of Italians, Greeks, Turks, Jews, Arabs, and all the other races which traffic up and down the Mediterranean. English is taught in the schools, but the official language of the law courts is Italian.

Malta is ruled as a British crown colony by a British governor assisted by an executive council. There is also a legislative council which includes both appointed and elected members. The chief products of Malta are cotton, potatoes, onions, grains, and tropical fruits, but food has to be imported every year to supply the needs of the dense population. The capital and chief port is Valletta, with a population of about 25,000. It contains many interesting buildings, notably the Grand Masters' palace and St. John's cathedral. Population of colony, 230,000.

Mammals. "The mammal," says an English writer, "is a *family* animal." Unlike reptiles and all lower forms of life, which reproduce by means of eggs and early turn their young adrift to shift for themselves, the young of the mammals are fed by the mother with milk from her breasts during a considerable period of infancy, and learn from her example and even teaching many valuable lessons in the struggle for existence. This was a new thing in the expanding story of life when mammals first appeared. It helps to make mammals the highest class in the Animal Kingdom.

Mammals are also the only animals which have developed hair as a protection against the weather; some water-dwelling mammals (whales) and others have only scanty hair; hedgehogs have transformed their hair into spines, and armadillos have changed part of theirs into bony plates or scales. Mammals are warm-blooded, in this respect resembling birds (which wear feathers in place of the mammals' fur) and differing from fishes, reptiles, and amphibians, which are cold-blooded.

In the lowest class of mammals—the duckbill and echidna of Australia—the young are hatched from eggs, but are nourished by the mother with milk secreted from pores all over the flat nipple-less breast (*see* Duckbill). The "marsupials," such as the kangaroo, bring forth living young, which, however, are very imperfectly developed. These are immediately placed on the mother's nipples in the pouch, which is characteristic of their order, and there they are carried and nourished until they can shift for themselves (*see* Kangaroo). "Placental" mammals bring forth fully developed young, which are suckled and protected by the mother in the manner with which we are familiar in the case of all the higher animals, including man.

Orders of Mammals

The most important orders included in the class of placental mammals are these: *Edentata*, toothless animals, like the armadillo, hairy ant-eater, etc.; *Rodentia*, the gnawers, including squirrels, hares, the mouse, rat, beaver, and the like; *Insectivora*, the insect-eaters, like shrews, hedgehogs, moles, and similar animals; *Chiroptera*, the bats; *Cetacea*, the whales and dolphins; *Ungulata*, a very important group of hoofed animals, containing the tapir, rhinoceros, horses, swine, camels, deer, cattle, giraffe, yak, goats, sheep, antelope, musk-ox, and a few others; *Carnivora*, the flesh-eating mammals, as bear, otter, raccoon, badger, mink, dog, fox, hyena, tiger, lion, lynx, walrus, seal, etc.; and *Primates*, the highest order, lemurs, monkeys, apes, and man.

AN EXCITING MOMENT IN PREHISTORIC TIMES



Here a number of our prehistoric ancestors have discovered a mammoth, and have wounded him. Undoubtedly they will make a feast of him in the end, but it will be at a cost of several lives.

Mammoth and Mastodon. In various parts of the world are found the bones and other remains of these large elephant-like animals, which probably ceased to inhabit the earth before the beginning of historic times. In some of the caves of Europe are found drawings which show that men of the Stone Age hunted these monsters.

The difference between the mammoth and the mastodon seems to have been chiefly in the teeth. Both were about the size of the largest Asiatic elephants of today, but unlike living elephants their tusks were curved upward and their bodies covered with hair. The mammoth especially had a shaggy mane. The largest tusks discovered measure about 12 feet in length and weigh 250 pounds. Their teeth and tusks are so abundant as to supply a considerable amount of the ivory of commerce. At least 100 pairs of tusks have been sent to market annually for the past 200 years. These great animals fed upon the shoots and cones of the fir and pine forests of those far-off days. Besides those found in Siberia, they were abundant also in England, Central Europe, and in North America.

Several remarkable finds have been made of mammoth carcasses frozen in the icy cliffs along the Arctic coast of Siberia. In 1801 a specimen was discovered with the tusks still in the sockets, every bone in its place, and the flesh so well preserved that the sledge dogs eagerly ate it. The thick skin was still clothed with long dark hair, beneath which was a dense woolly fur, well fitted to protect the animal against the arctic cold. And yet it was probably 50,000 years since the unfortunate creature had lost its life by being engulfed in a marsh or bog, which later had turned into a great cliff of ice.

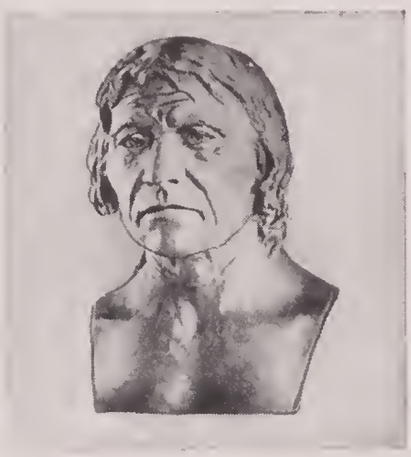
MAN. Science can do little more than guess at the period when man first made his appearance on this earth. Bones buried in ancient soils, rude weapons chipped from stone, carved bits of horn and ivory, pictures of animals long since extinct found on the walls of forgotten caves—these provide the material with which scientists are slowly and patiently piecing together a few details of man's early existence.



THE JAVA "APE-MAN"

This much we know, that man existed many thousands of years earlier than was formerly believed. Indeed, it is certain that the prehistoric period of man's existence was vastly longer than the period covered by recorded history. For history, in the restricted sense, did not begin until about 4,000 or 3,000 B.C., when the art of writing seems first to have appeared; while stone tools have been discovered which date back at least 50,000 years. And to this we must add the countless generations that undoubtedly elapsed before man learned to make such tools.

The earliest remains which might be called human are the top of a skull, some teeth, and a thigh bone found in a river bed near Trinil in the island of Java in 1891. The creature to which they belonged has been named *Pithecanthropus erectus* or "erect ape-man" (*see* Ape). Whether, in fact, he was a highly developed manlike ape, or a primitive apelike man has not been settled. The size of his brain, as indicated by skull measurements, was about midway between the brain of a chimpanzee and the brain of the lowest type of human being alive today. Some scientists hold that the Java "ape-man" lived no less than 500,000 years ago.

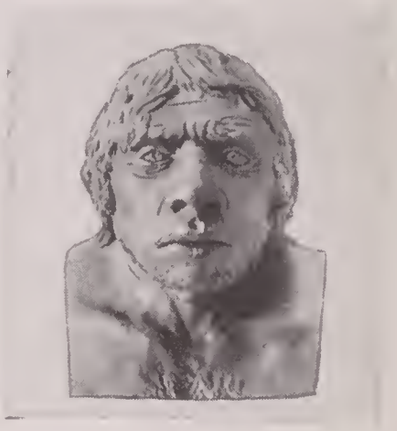


THE CRO-MAGNON MAN

The three pictures on this page are from reconstructions made from fossil remains for the American Museum of Natural History, and represent the probable appearance of these primitive human types.

The next oldest relic of primitive man is a lower jaw found near Heidelberg, Germany, from which the whole skull has been reconstructed by the amazingly accurate methods of comparative anatomy. Here we have an individual of undoubted human character, yet differing widely from any modern races. The jaw is massive and large and entirely lacks the chin projection. From the fact that the overlying earth was 80 feet deep and that near by were the remains of extinct species of elephants and rhinoceroses, the age of the "Heidelberg man" has been put by some scientists at about 200,000 years.

Next in point of antiquity comes the "Neanderthal man," so named because the remains of the first recognized member of this race were found in the Neanderthal near Düsseldorf, Germany. Many other remains of the same type have since been found from which much valuable information has been obtained. The Neanderthal race probably lived somewhere between 50,000 and 100,000 years ago. Its members had acquired considerable skill in making stone weapons, lived in rock shelters, used fire, and hunted small game and perhaps also the wild horse, the wild ox, and the reindeer. They apparently buried their dead with some care.



THE NEANDERTHAL MAN

This race seems to have been exterminated by a people of far higher culture called the Cro-Magnons, from the cave in France where their first remains were discovered (*see* Cave Dwellers). Whereas the earlier types are often classed as separate species of mankind (*Homo heidelbergensis*, *Homo neanderthalis*, etc.), the Cro-Magnons are recognized as belonging to the same species (*Homo sapiens*) as modern men. They were tall and strong, and, if we are to judge from their paintings on the walls of their caves as well as from their skull measurements, they were exceedingly intelligent people. Mixed with the Cro-Magnon remains have been found bones belonging apparently to a people of the negro type, called the Grimaldi race, but their origin and probable history is much disputed. The Cro-Magnons appear to have been either driven out of Europe or assimilated by the Neolithic or late Stone Age peoples, whose domination carried over into the early historic period (*see* Civilization).

The famous "Piltdown skull," found in Sussex, England, in 1911, has been the source of vigorous controversy because of the difficulty in determining whether the apelike jawbone found with it really belonged to the same individual.

Judging from all the evidence at hand, most students of the subject are agreed that the human race originated somewhere in central Asia, and spread from there over the rest of the world. The failure of all efforts to find undoubted remains of early Stone Age peoples in America leads to the further belief that the earliest human inhabitants of this continent were

the immigrants from Asia, from whom all the Indian tribes from Alaska to Patagonia have probably descended.

In the zoölogical scale, man is classed in the group *Anthropoidea* of the order Primates, which includes also the apes, baboons, and monkeys. In this group he forms a separate family (*Hominidae*) composed of the single genus *Homo* and the single species *Homo sapiens*, of which all the different living races are mere variations (*see* Races of Mankind).

Man, Isle of. In the very center of the British Isles, nearly equidistant from England, Ireland, and Scotland, lies the little Isle of Man, with an area of only 227 square miles. The close proximity of mountain, glen, and sea gives it a picturesqueness which makes it one of the most popular summer resorts of the British Isles, attracting nearly half a million visitors annually. The land is dotted with remnants of prehistoric times, including many interesting vestiges of men in the Stone Age; and the island is noted for its Manx breed of tailless cats.

The surface is hilly for the most part, with many smooth round mountains which, owing to the strength of the winds, are usually treeless. Over half the land is cultivated, oats, barley, and turnips being the chief crops. Fishing is important, and mining for zinc and silver is carried on. The principal town is Douglas, the capital (population, 22,000), a favorite watering place on the coast. Although a part of the United Kingdom of Great Britain and Ireland, the Isle of Man has "home rule" under a centuries-old constitution, which includes a representative assembly called the House of Keys. Many people still use the Manx language. Population, about 53,000.

Man'atee. "Sea cow" is the name commonly given to this aquatic mammal, three species of which are known. One lives on the western coast of tropical Africa, one on the eastern coast of South America, and the third on the Florida coast. The South American form is the best known; it extends to the West Indies and the Gulf of Mexico. The Florida species has now become very rare.

The South American manatee is about 8 or 10 feet in length with a thin, broad, shovel-shaped tail. There are no hind limbs, but the front, flipper-like limbs are managed with much dexterity. The skin is grayish in color with sparse hairs. The manatees are slow-moving, mild, inoffensive creatures, living entirely on vegetation. This is drawn into the mouth by the peculiar upper lip, which is split into two hairy pads that move sideways on each other. They live in the water but come up to breathe.

The manatees belong to the order *Sirenia*, which also includes the dugong, a closely related animal found along the shores of Australia, the Indian Ocean, and the Red Sea. Unlike the manatee, the dugong never ascends rivers, and it has a slightly forked tail. The male has two large downward-pointing tusks. Scientific name of the South American manatee, *Manatus americanus;* dugong, *Halicore dugong*.

Manchester, England. Long before America was discovered, Manchester was noted, as it still is, for its textile manufactures. In those days it specialized in woolen cloth, which was produced by Flemish weavers settled there. Now it is the world center for the cotton trade, having grown with enormous rapidity since the great inventions that revolutionized the cotton industry in the 18th century. The factories, however, are not so much found in the city itself as in the suburbs and ring of neighboring towns, for Manchester is mercantile rather than manufacturing. This Lancashire district is the most populous industrial section in England, owing to the moist climate which makes it peculiarly adapted to cotton spinning, and the rich coal fields which supply the innumerable factories. Since 1894 Manchester has been not only the trading center for this region, but, with the opening of the great Ship Canal, the seaport as well. This canal, which extends to the mouth of the Mersey River, a distance of 35 miles, has enormously increased Manchester's industrial and commercial importance.

William Dean Howells said that Manchester is probably as attractive as could be expected of a place which has always had so much to do besides looking after its appearance. Certainly it is not a beautiful city, although it has a good park system, and some very attractive residences are found near its boundaries. There are, however, a number of splendid public buildings. The Town Hall is one of the most magnificent edifices of its kind in England; the Exchange is a splendid building in the Classic style, and the Assize Courts is a beautiful example of Gothic architecture. The Cathedral, built in the 15th century, is interesting for its age, although not remarkable for its size. It is also the seat of a university.

Besides the textile industry, which includes spinning, weaving, printing, bleaching, and dyeing, much machinery is manufactured in Manchester for the cotton mills, and many miscellaneous small wares. Population, about 740,000.

Manchuria (*măn-chu'rĭ-a*). One day, while the Mongols under Genghis Khan were ruling China—so runs a Chinese tale—three heaven-born maidens were bathing in a lake in the Changpai-Shan Mountains when a passing magpie dropped a ripe red fruit into the lap of one of them. The maiden ate the fruit, and after some time a son was born to her, whom she named Aisin Gioro, or "the Golden." In due course his youngest son came to rule over this branch of the Tatars, and it was he who named his people "Manchus," or "the Pure." Centuries passed; then at last a descendant of Aisin Gioro after numerous border fights conquered all China and established there the Manchu dynasty, which ruled that kingdom from 1644 until it became a republic in 1912.

Manchuria forms nominally the northeastern part of the Chinese Republic, with the Yellow Sea to the south, China proper and Mongolia to the west, Siberia to the north and east, and Korea to the east and south. The huge ranges of the Shan-a-lin and

Khingan mountains, with many great forests and fertile valleys, occupy the north and east, while the south and west is a hilly and occasionally swampy plain, with one of the richest soils in the world. Only about a fifth of the arable soil is under cultivation, but the crops of wheat, rice, cotton, and particularly soy beans are of great value. The winters are cold and the summers hot, but the climate is healthful. Manchuria is believed also to have great mineral wealth, including coal and gold, mostly undeveloped.

There are more than 1,500 miles of navigable rivers, the chief streams being the Liao-ho, the Argun, and the Amur, with the tributaries of the latter. Port Arthur, at the tip of the Kwan-tung peninsula to the south, has an ice-free harbor, one of the finest on the Pacific coast; it was taken from the Russians by Japan in 1905. Mukden, the capital of Shengking, the most southern and most populous of the three provinces of Manchuria, is also the chief city, with about 150,000 inhabitants. Harbin on the Sungari River is a commercial and manufacturing city, with modern steam sugar refineries, bean-oil mills, etc. More than 2,000 miles of railroad traverse the province, including the main Trans-Siberian line to Vladivostok and the southern branch to Port Arthur. Japanese influence in Manchuria has grown steadily since the close of the Russo-Japanese War in 1905. Area of Manchuria, about 364,000 square miles; population, about 12,000,000, mostly Chinese.

Man'dolin. A musical instrument somewhat like the ancient lute. The gourd-shaped body is usually made by gluing together narrow pieces of different kinds of wood and adding a sounding-board, finger-board, and neck like a guitar. The mandolin is played by striking the metal strings rapidly with a piece of bone or metal called a "plectrum." For this reason the mandolin is incapable of long sustained notes, such notes being produced by a rapid back-and-forth stroke across the double strings. While unsuited to ordinary orchestral work, the instrument is a favorite for song accompaniments, especially in Spain and Italy. The Neapolitan mandolin, with four double strings, is the type most commonly used.

Mandrake. The true mandrake, a native of southern Europe and the Orient, is an almost stemless, thick-rooted, and large-leaved narcotic plant of the nightshade family, with large stalked whitish flowers, followed by round berries. The root often crudely resembles the human figure. It was well known to the ancients and they had various superstitions about it, some of which still exist among the natives of the East. In the United States the May-apple is often called a mandrake. (*See* May-apple.)

Manganese'. When America entered the World War it possessed within its own boundaries sufficient quantities of all but seven of the minerals necessary for munitions and war material (*see* Minerals). One of the seven that it lacked was manganese. This metallic element is essential as an alloy for steel and copper, thus increasing their hardness, tenacity, and elasticity in the gearings and wearing parts of heavy machinery, ordnance, and armor plate (*see* Alloys).

Manganese resembles iron but is not magnetic. It has a grayish luster faintly tinged with red, and rusts rapidly in moist air. Pure manganese is only a chemical curiosity. "Spiegeleisen" is an iron with about 12 per cent manganese, and is made in a special high-temperature furnace; "ferro-manganese" has about 70 per cent. Both are largely used as steel alloys and are added to the molten steel as it comes from the converter or open hearth furnace. Salts derived from manganese are used in chemistry, medicine, and the arts. "Condy's fluid," a familiar disinfectant, is sodium permanganate in solution.

Prior to 1914 Russia was the greatest producer of high-grade manganese. Brazil and India ranked next. The use of the low-grade deposits in the United States involves too heavy expense to be profitable in normal times.

Mango. The mango tree is cultivated through the tropical and subtropical regions of both the New and the Old World for its shade and beauty as well as for its delicious fruit which, among the finer varieties, rivals the choicest pineapples. Of the 30 species native to southeastern Asia, the most widely cultivated (*Mangifera indica*) comes from India. It grows from 30 to 40 feet high and has dense glossy evergreen foliage. The fruit is kidney-shaped, four or five inches long, and has a smooth yellowish-green or reddish skin. It contains one large flattened seed, nearly as long and often nearly as wide as the fruit itself. The kernel is sometimes used for food. In the wild mango the fruit is stringy and sour, with a disagreeable flavor of turpentine, but through culture and selection it has become sweet and luscious. When unripe it is used for pickles and preserves and when ripe is eaten raw. The West Indies furnish most of the mangoes in American markets. In the United States California grows only enough for its home markets and Florida produces a very limited supply.

Mangrove. These remarkable trees, which abound at the mouths of streams and along the swampy shores of tropical seas, are great soil-builders, for their numerous roots provide a network to catch mud and débris. In Florida hundreds of acres of fertile land have thus been formed. The mangrove, like the banyan, constantly sends out roots from its trunk and branches, and these, descending in arched fashion, form new trunks connected with the parent stem.

The seeds, too, have a most peculiar way of germinating, for they sprout while the fruit is still attached to the branch. Another unusual feature of the tree is the air-roots—little branches of the roots which project above the mud and carry air through minute openings to the roots beneath.

The wood of certain species is hard and durable, and is used for wharf-piles and fuel; the bark, which is rich in tannic acid, is used for tanning; and the fruit is sweet and produces a light wine. Scientific name of common mangrove, *Rhizophora mangle*.

MANIL'A, PHILIPPINE ISLANDS. It is noonday, the hour of *siesta* in the sweltering, stinging heat of the tropics. Only natives and noisy American street-cars are abroad in the narrow streets of Manila, the capital of "little America in the East." Shops are closed. From the old walled city, where Fort Santiago fronts on the bay, to the farthest suburb beyond the river, the world has crept for two hours' rest into the dim gloom of rambling Spanish two-storied houses.

At two o'clock the town wakes up again. The busy Pasig is choked with long native craft, steam launches, and coasting-boats. Along the stone embankments are warehouses where sugar, tobacco, copra (dried coconut meat), and mountains of brown hemp await transfer to the holds of ocean liners that lie at anchor outside in beautiful Manila Bay, encircled by an amphitheater of green hills which stretch round past Cavite (the principal coaling station of the United States in Asiatic waters) to the narrow entrance and two fortified islands, Cavallo and Corregidor.

After sunset all Manila sits about on benches or in carriages in the Luneta, the fashionable promenade-park along the bay. The American tourist feels very much at home when soldiers from Fort William McKinley, five miles away, stand at attention while the Philippine Constabulary Band, one of the finest in the world, plays the 'Star Spangled Banner'.

Manila was a native village when the Spaniards took it over in 1571. Today it sprawls over a great deal of territory, about 20 square miles on both sides of the Pasig, from the bay to the shores of Laguna de Bay, an inland lake. Its medieval appearance has been modified by the vigorous measures which have been taken under American administration to improve the harbor, streets, sanitation, and water supply. There is now an excellent school system and a flourishing university. In the battle of Manila Bay, Admiral Dewey destroyed the Spanish fleet on May 1, 1898; the city itself capitulated August 13. Population, about 285.000. (*See* Philippine Islands.)

Where CANADA GROWS *the* WORLD'S *finest* WHEAT



MANITO'BA, CANADA. The Indians of the prairies believed that the region now included in the province of Manitoba was especially favored by the Great Spirit, and that around the "narrows" of Lake Manitoba his voice might be heard. Therefore, they called the region "Manito-Waban" (Great Spirit's Narrows). The inhabitants of today agree with the redmen in regarding the province as "God's Country," and for proof they point to the broad prairies of the southwest, among other sections, covered with waving fields of grain, which form one of the greatest grain regions in the world. These plains were once the bed of a great inland lake, Lake Agassiz, which covered about three-fourths of Manitoba and extended into the United States, and they are composed of very rich soil. The soil is especially rich in the valley of the Red River (*see* Red River of the North), and it is here that the best grades of wheat are grown.

Extent.—North and south, 760 miles; east and west, 495 miles. Area, 251,832 square miles, 19,906 of which are water. Population, about 620,000.

Physical Features.—Great prairies in southwest and south, with broken and hilly land of the Laurentian country in the north and east. Higher elevation, Riding and Duck mountains. Lakes Winnipeg, Winnipegosis, Manitoba, and Dauphin, and numerous small lakes. Principal rivers: Red River of the North, Assiniboine, Saskatchewan, and Winnipeg, draining into Lake Winnipeg; Nelson, draining Lake Winnipeg into Hudson Bay; Churchill and Hayes, also emptying into Hudson Bay.

Products.—Wheat, oats, barley, rye, potatoes, flax, hay; live stock and dairy products; building materials (brick, cement, stone, gypsum); lumber; fur and game, fish.

Principal Cities.—Winnipeg (capital, 225,000), Brandon, St. Boniface.

On the great farms, most of them from 160 to 640 acres, teams of four, six, or eight horses and powerful tractors plow and harrow the soil and cut the grain at a speed which would astonish the eastern farmer of 60 or 80 acres.

Occasionally the landscape is broken by lakes or a bit of marsh-land with little ponds of still water. The largest body of water, Lake Winnipeg, is about the size of Lake Erie, though it is nowhere more than 70 feet deep.

The province enjoys an invigorating climate, though variations are sudden and of great range. The winters are severe, but the springs are early, and advance rapidly to summer heat. An April that begins with wintry weather may be hot before it is succeeded by May. The great heat of midsummer causes the grain to ripen quickly, and there is little rain at harvest time, so that crops are gathered without dread of wetting. Though there is sometimes an

early frost, the abundant average yield of grain more than balances the loss from this danger. The soil and the climate are adapted not only to producing a great quantity of wheat—sometimes nearly 100,000,000 bushels a year—but also to growing a fine quality, so that "Manitoba hard" has become the standard for the highest grade of wheat sold. Cattle and hog raising and dairying are fast becoming more important.

The northern part of Manitoba, bordering on Hudson Bay, is too cold for agriculture, but it is in this section that the hunter and the trapper find the fur-bearing animals,—the minks, muskrats, martens, foxes, and others,—whose skins command such a high price in Europe and America. Here also, and in the western part of the province, are numerous forests of spruce which make lumbering one of the important industries. Another source of wealth which is being developed is the rich deposits of gold and copper. Lakes Manitoba and Winnipeg afford large quantities of very fine fish.

These products and the wheat from the south all find their way to Winnipeg, the capital and the principal city. This is the "neck of the funnel" for east and west freight, and this fact has made the city a great railroad center (*see* Winnipeg).

The history of Manitoba is the history of the Hudson's Bay and Northwest companies and of the Canadian Pacific Railway. Until 1870 the land was owned and the people governed by the great fur-trading company, which was opposed to settlement of the territory because that would decrease the supply of fur-bearing animals. The only important settlement in the region was the Red River Settlement made by Lord Selkirk. Apart from the Indians and half-breeds most of the men in the region were of the hardy Scotch stock.

In 1870 the Hudson's Bay Company transferred its rights to the recently formed Dominion of Canada. The French *métis*, or half-breeds, feared that their language and religion would not be respected, and there followed the Red River Rebellion, or, as it is known from the name of its leader, Riel's first insurrection. The uprising was suppressed, but the problems which caused it have continued to disturb the politics of the province to the present time.

But the region was chiefly one of fur-traders, half-breeds, and Indians, when the Canadian government took possession of it; and it was the building of the great Canadian Pacific Railway that changed it to the prosperous province of today. The new line brought thousands of settlers from the older sections of Canada, from the United States, and from Europe, with the result that the population leaped from a white population of 1,565 in 1870 to its present total of over 600 000. Manitoba is still far from being crowded, however, for it covers an area of 252,000 square miles, more than any of the United States except Texas. Until 1912, when the province was extended northward to Hudson Bay, its area was only about one-third its present extent.

MANTIS. Perhaps no living creature conceals behind a pious appearance a more blood-thirsty and malignant disposition than that great hypocrite, the "praying mantis," a relative of the grasshopper and cricket. From the moment of its birth, this insect is a murderer and a cannibal and is, therefore, of use in preying on other insects.

THE PRAYING MANTIS AT "PRAYER"



How prim and proper the Mantis looks with its "arms" folded so nicely and its head bowed between them! That's how it got its name—Praying Mantis. Yet it would be nearer the truth to call it the "Preying" Mantis, for this is just a pose that conceals its fierce, blood-thirsty disposition.

With the front part of its body raised up in a prim pose, the hind part swelling out like the flounce of an old-fashioned skirt, and with its big arms folded up so properly beneath its small triangular head, the mantis does indeed look like an old lady at her prayers. But concealed on the inside of those arms are sharp cruel claws, and that head, cocked now to the right, now to the left, holds two large eyes constantly on the lookout for unwary victims.

Perhaps a fly ventures too near. Suddenly the mantis springs; those long scythe-shaped arms shoot out, and the fly is caught on their curved barbs. Then one leg after another of the unfortunate captive disappears in that greedy mouth; the body is sucked dry; and the mantis is back at its prayers. Fights to the death often take place between two of these insects, and the victor dines on the vanquished.

Members of the mantis family are found in the southern United States and Europe and in nearly all tropical countries. The commonest American species, called the "rear-horse" or "mule killer," is of a leaf-green color, and hides in trees and grass. The eggs are laid in tough cases attached to twigs, and as soon as the young hatch, they start killing small insects.

These creatures have been looked upon with superstitious awe since ancient times. In China they are kept in cages and matched in prize fights.

Scientific name of mantis family, *Mantidae* (from the Greek *mantis*, "prophet"). Their life history is similar to that of grasshoppers and others of the Orthoptera order.

The TREE *that Gives Us* MAPLE SYRUP

MAPLE. The maples are very highly prized for park and street planting, for their foliage is dense and beautiful, casting a cooling shade during the hot months, while their autumn coloring of pure red, yellow, and orange is especially brilliant.

There are about 100 species, easily identified by their broad leaves and winged fruits. They are native throughout the temperate regions of the Northern Hemisphere.

The sugar maple, which produces the sap from which maple syrup and sugar are made, is perhaps the finest of the group. Its hard wood is used extensively in the manufacture of the better grade of furniture. The beautifully marked gnarled specimens, called "bird's-eye" or "curly" maple, are used for veneer. The sugar maple tree grows from 50 to 120 feet high, is domelike in form, and has abundant dark green foliage. The sap begins to run early in spring and flows about three weeks, a tree of average size producing from four to eight pounds of sugar. This tree is native from Newfoundland southward and westward. The black maple is a variety of the sugar maple. It flourishes near streams and in river bottoms, and produces sugar sap in abundance.

THE MAPLE THAT PROVIDES THE SUGAR CAKES



This is the Sugar Maple, its trunk, leaves, and "winged" seeds. Under that rough bark flows the sap that gives us the delicious cakes of sugar and the flowing syrup for our griddle cakes and waffles. Notice the squirrel who got into the picture uninvited, and is scampering up the trunk.

The silver (also called white or soft) maple is a very rapid grower and is also very beautiful, being planted extensively as a shade tree. Its average height is about 50 feet, although it often attains twice that size. Its branches are long and drooping, and the abundant leaves are pale green above and silvery-white underneath. This species thrives best along river banks. It is found from Maine to Florida and westward to the Dakotas.

The red or scarlet maple is one of the first to deck itself out in the spring, for before the leaves appear it puts forth exquisite drooping crimson blossoms. The young foliage is red, and in autumn the leaves are among the first to take on a crimson or deep golden hue. The red maple is common in the north and is found as far south as Florida and westward to Texas and the Dakotas.

The Norway maple is a cultivated tree, familiar along the roads and in parks. It is very handsome and has an abundance of thin smooth leaves similar to those of the sugar maple.

Scientific name of sugar maple, *Acer saccharum*. Bark light gray, rather smooth, becoming rough and scaly with age. Leaves simple, opposite, long petioles, sometimes having three, five, or seven coarsely cut and sharply pointed lobes, rich green and glossy above, lighter underneath.

Life in a Maple Sugar Camp

I THINK there is no part of farming the boy enjoys more than the making of maple sugar; it is better than "blackberrying," and nearly as good as fishing. And one reason he likes this work is that somebody else does the most of it. It is a sort of work in which he can appear to be very active, and yet not do much.

In my day maple sugar making used to be something between picnicking and being shipwrecked on a fertile island, where one should save from the wreck tubs and augurs, and great kettles and pork, and hen's eggs and rye-and-Indian bread, and begin at once to lead the sweetest life in the world. I am told that it is something different nowadays, and that there is more desire to save the sap, and make good pure sugar, and sell it for a large price, than there used to be; and that the old fun and picturesqueness of the business are pretty much gone. I am told that it is the custom to carefully collect the sap and bring it to the house, where there are built brick arches, over which it is evaporated in shallow pans, and that pains is taken to keep the leaves, sticks, and ashes and coals out of it, and that the sugar is clarified;—and that, in short, it is a money-making *business*, in which there

WHEN THE SAP BEGINS TO "RUN"



Here we see the men busily at work in the maple grove near the sugar camp. Some are boring the holes to let out the sap, one is emptying his bucket of juice, another is attaching his pail to the tree, and the little boy, of course, is testing the sap to see if it is up to the standard.

is very little fun, and that the boy is not allowed to dip his paddle into the kettle of boiling sugar and lick off the delicious syrup. The prohibition may improve the sugar, but it is cruel to the boy.

As I remember the New England boy, he used to be on the *qui vive* in the spring for the sap to begin running. I think he discovered it as soon as anybody. Perhaps he knew it by a feeling of something starting in his own veins—a sort of spring stir in his legs and arms, which tempted him to stand on his head, or throw a handspring, if he could find a spot of ground from which the snow had melted. The sap stirs early in the legs of a country boy, and shows itself in uneasiness in the toes, which get tired of boots, and want to come out and touch the soil just as soon as the sun has warmed it a little.

Perhaps the boy has been out digging into the maple trees with his jacknife; at any rate, he is pretty sure to announce the discovery as he comes running into the house in a great state of excitement—as if he had just heard a hen cackling in the barn—with, "Sap's runnin'!"

And then, indeed, the stir and excitement begin. The sap-buckets, which have been stored in the garret over the woodhouse, and which the boy has occasionally climbed up to look at with another boy, for they are full of sweet suggestions of the annual spring frolic,—the sap-buckets are brought down and set out on the south side of the house and scalded. The snow is still a foot or two deep in the woods, and the ox-sled is got out to make a road to the sugar camp, and the campaign begins. The boy is everywhere present, superintending everything, asking questions, and filled with a desire to help the excitement.

It is a great day when the cart is loaded with the buckets and the procession starts into the woods. The sun shines almost unobstructedly into the forest, for there are only naked branches to bar it; the snow is soft and beginning to sink down, leaving the young bushes spindling up everywhere; the snow-birds are twittering about, and the noise of shouting and of the blows of the ax echo far and wide. This is spring, and the boy can scarcely contain his delight that his outdoor life, with all its activity and excitement, is about to begin again.

In the first place the men go about and tap the trees, drive the spouts, and hang the buckets under. The boy watches all these operations with the greatest interest. He wishes that sometime when a hole is bored in a tree the sap would spout out in a stream as it does when a cider-barrel is tapped; but it never does,—it only drops, sometimes almost in a stream, but on the whole slowly.

Then the camp is to be cleared of snow. The shanty is re-covered with boughs. In front of it two enormous logs are rolled nearly together, and a fire is built between them. Forked sticks are set at each end, and a long pole is laid on them, and on this are hung the great caldron kettles. The huge hogsheads are turned right side up, and cleaned out to receive the sap that is gathered. And now, if there is a good "sap run," the establishment is under full headway.

NIGHT WORK IN A SUGAR CAMP



"The great fire is never let out night or day as long as the season lasts. Somebody is always cutting wood to feed it; somebody is busy most of the time gathering in the sap; somebody is required to watch the kettles that they do not boil over and to fill them. It is not the boy however; he is too busy!"

The great fire that is kindled up is never let out, night or day, as long as the season lasts. Somebody is always cutting wood to feed it; somebody is busy most of the time gathering in the sap; somebody is required to watch the kettles that they do not boil over, and to fill them. It is not the boy, however; he is too busy with things in general to be of any use in details. He has his own little sap-yoke and small pails, with which he gathers the sweet liquid. He has a little boiling-place of his own, with small logs and a tiny kettle. In the great kettles the boiling goes on slowly, and the liquid, as it thickens, is dipped from one to another, until in the end kettle it is reduced to syrup, and is taken out to cool and settle, until enough is made to "sugar off." To "sugar off" is to boil the syrup until it is thick enough to crystallize into sugar. This is only done once in two or three days.

Eager to Get at the Sugar

But the boy's desire is to "sugar off" perpetually. He boils his kettle down as rapidly as possible; he is not particular about chips, scum, or ashes; he is apt to burn his sugar; but if he can get enough to make a little wax on the snow, or to scrape from the bottom of the kettle with his wooden paddle, he is happy. A good deal is wasted on his hands, and the outside of his face, and on his clothes, but he does not care; he is not stingy.

To watch the operations of the big fires gives him constant pleasure. Sometimes he is left to watch the boiling kettles, with a piece of pork tied on the end of a stick, which he dips into the boiling mass when it threatens to go over. He is constantly tasting of it, however, to see if it is not almost syrup. He has a long round stick, whittled smooth at one end, which he uses for this purpose, at the constant risk of burning his tongue. The smoke blows in his face; he is grimy with ashes; he is altogether such a mass of dirt, stickiness, and sweetness, that his own mother wouldn't know him.

Strange Sights and Sounds by Night

He likes to boil eggs with the hired man in the hot sap; he likes to roast potatoes in the ashes, and he would live in the camp day and night if he were permitted. Some of the hired men sleep in the bough shanty and keep the fire blazing all night. To sleep there with them, and awake in the night and hear the wind in the trees, and see the sparks fly up to the sky, is a perfect realization of all the stories of adventures he has ever read. He tells the other boys afterwards that he heard something in the night that sounded very much like a bear. The hired man says that he was very much scared by the hooting of an owl.

The great occasions for the boy, though, are the times of "sugaring off." Sometimes this used to be done in the evening, and it was made the excuse for a frolic in the camp. The neighbors were invited; sometimes even the pretty girls from the village, who filled all the woods with their sweet voices and merry laughter and little affectations of fright. The white snow still lies on all the ground except the warm spot about the camp. The tree branches all show dis-

CLEANING OUT THE STORAGE TANKS



They always seem to be cleaning up around a maple sugar camp. Here the men are just finishing up the scalding of the storage tanks with hot water. These tanks are made of tin or galvanized iron and when they contain syrup are carefully covered over to prevent any dirt getting into them. From these storage tanks the syrup is transferred to the evaporators. The best modern evaporators are made so that the sap feeds automatically into the pans, flowing fast or slow according to the amount of heat under the evaporator. You see the reason for that, don't you? The hotter the fire, the faster the evaporation and the more fresh syrup required.

THIS MAN IS MAKING MAPLE SUGAR CAKES



The molds in which the toothsome maple sugar cakes are made are very much like muffin pans, only there are a great many more molds to the tray. The syrup which is to be poured into these molds is boiled longer than the syrup which is to be used on the morning wheat cakes. The syrup for the cakes is put into those square cans you see on the shelf at the back.

contained in the Easy Reference Fact-Index at the end of this work

tinctly in the light of the fire, which sends its ruddy glare far into the darkness, and lights up the bough shanty, the hogsheads, the buckets on the trees, and the group about the boiling kettles, until the scene is like something taken out of a fairy play.

Sugar Syrup Cooled in Snow! Um! Um!

At the "sugaring off" they used to pour the hot sugar upon the snow, where it congealed, without crystallizing, into a sort of wax, which I do suppose is the most delicious substance that was ever invented. And it takes a great while to eat it. If one should close his teeth firmly on a ball of it, he would be unable to open his mouth until it dissolved. The sensation while it is melting is very pleasant, but one cannot converse.

The boy used to make a big lump of it and give it to the dog, who seized it with great avidity, and closed his jaws on it, as dogs will on anything. It was funny the next moment to see the expression of perfect surprise on the dog's face when he found that he could not open his jaws. He shook his head; he sat down in despair; he ran around in a circle; he dashed into the woods and back again; he did everything except climb a tree, and howl. It would have been such a relief to him if he could have howled. But that was the one thing he could not do.—*Adapted from 'Being a Boy', by Charles Dudley Warner.*

MAPS. It is comparatively easy to show the earth's surface on a globe, but it is difficult to do so on the flat surface of a map. You will see why if you cut the skin of an orange into half-separated strips and remove them as a single piece. The result when flattened out will resemble the drawing in Fig. 1.

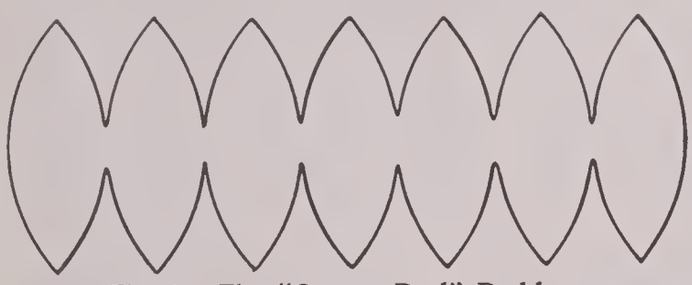


Fig. 1. The "Orange Peel" Problem

The nearest to a flat surface you could get by peeling off the surface of a geography globe would be a shape something like this, as you can find out by trying it on an orange.

Every boy discovers this difficulty of adjusting a flat surface to a sphere when he tries to cover a ball with a piece of leather; it can only be done by cutting the leather into specially shaped pieces and sewing them together.

But it *is* possible to cover the surface of a "cone" with a continuous piece of paper, or other material, and have it lie flat. One way of "projecting" maps, therefore, is to imagine the earth composed of two cones with the Equator as their common base. In this way we prepare what is called a "conic projection," which is fairly satisfactory for single states and countries, and other small sections of the globe's surface. The accompanying diagrams (Figs. 2 and 3) show how a conic projection is made. Such a projection is easily recognizable by the fact that the meridians are all straight lines diverging from a

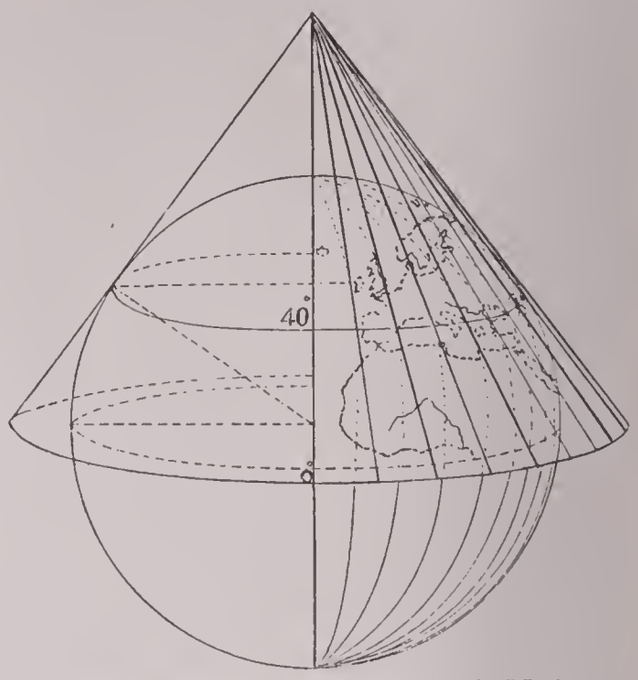


Fig. 2. How a Conic Projection is Made

common center, and the parallels are arcs of concentric circles. In what is called a "polyconic" projection the meridians, however, are slightly curved, and the parallels are not always concentric arcs.

Imagine a cone of paper fitted over the top of a globe touching the surface at (say) the 40th parallel of north latitude; this is then the "standard" parallel. Meridians are drawn at equal intervals on the paper as straight lines from the apex of the cone to its base, and the parallels appear as concentric circles drawn with the apex as a center.

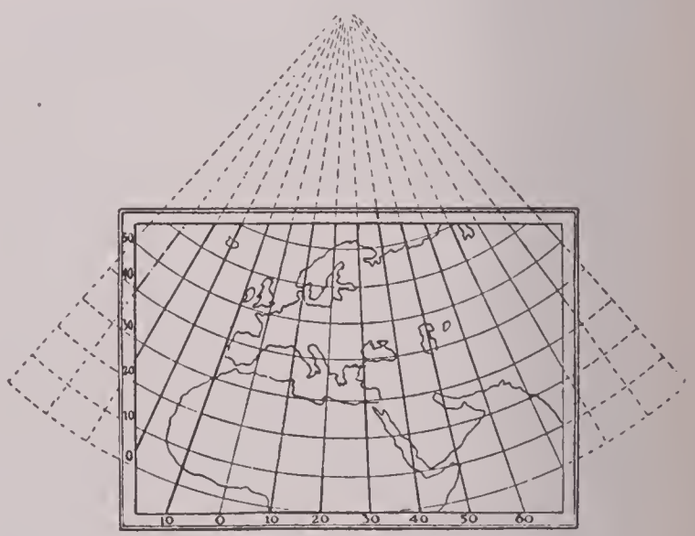


Fig. 3. The Completed Conic Projection

When the paper cone is unrolled it appears as above. In all conic projections the scale along every meridian and along the standard parallel is correct; but north and south of the standard parallel latitude and longitude are progressively distorted.

For showing the whole surface of the globe on a single map, what is called "Mercator's projection" is frequently used. In making this projection the globe is imagined as inclosed in a paper cylinder (Fig. 4). If the cylinder were of the same height as the globe, the east-and-west distances near the poles would be enormously exaggerated, while the north-and-south distances would be practically correct. To remedy this distortion of shape, a corresponding distortion north and south is introduced. Projection lines are drawn from the center of the globe at regular intervals of latitude and continued until they meet the surface of the cylinder.

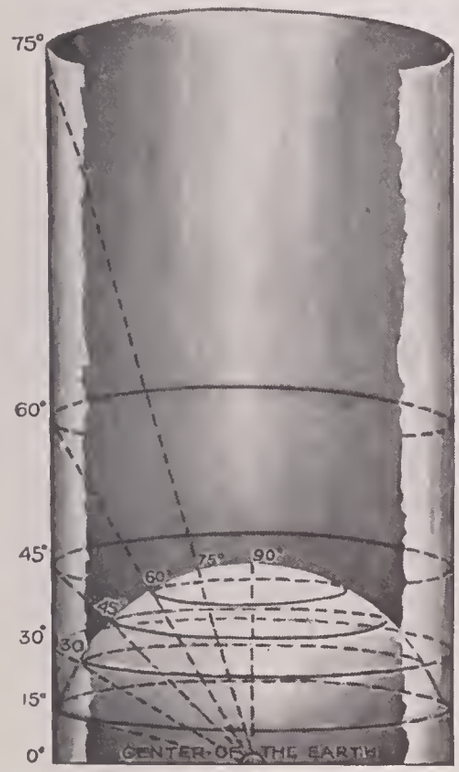


Fig. 4. Mercator's Principle

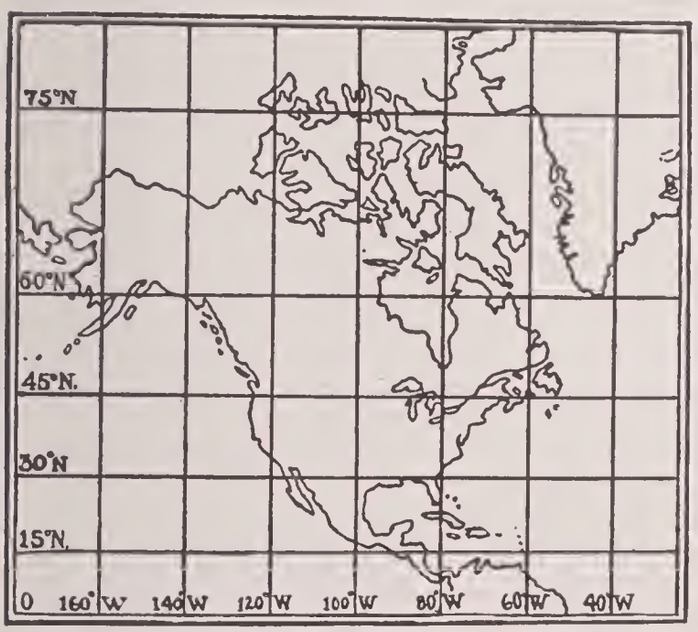


Fig. 5. Mercator's Projection Completed

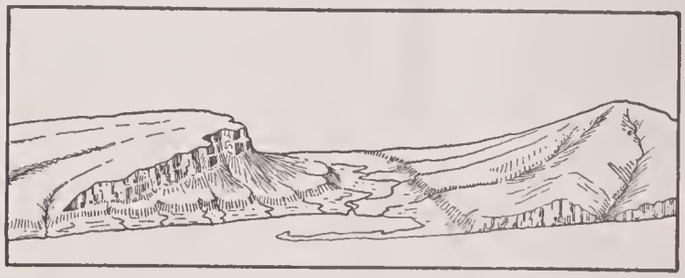
Thus the distance between the 60th and 75th parallels of latitude becomes enormously greater than that between the Equator and the 15th parallel, and the poles cannot be shown at all on these maps. Figures 4 and 5 show how the Mercator's projection is formed, and Figure 6 what it looks like when it is completed. In spite of its great exaggeration of areas towards the top and bottom of the map, this projection is very useful, especially for sailing charts. All meridians and parallels are straight lines crossing at right angles, and a compass course between any two points is the straight line connecting them.

There are many other types of map projections, but these are among the simplest. No map, it should


Fig. 6. Contour Map of a Coast Line

be remembered, can ever represent the surface of the earth as accurately as a globe. If you will examine a map of North America on a conic projection, and then on a Mercator's projection, you will see a very great difference in apparent size and shape. And yet each is an accurate representation according to its system of projection.

Maps which show the character of the surface of the ground are of several kinds known as "relief"


Fig. 7. Profile Sketch from Contour Map

maps, "topographic" maps, "contour" maps, etc An example of a contour map is given in Fig. 6. Such maps show the detail of the earth's surface by indicating with contour lines where planes of regularly increasing altitude would strike the surface of the ground. In this case the planes are 20 feet apart. In other words, imagine that the ocean has risen 20 feet at a time, and that after each rise an outline has been drawn around the parts of the land which were still above the surface. You can see how, in this way, every rise and depression of the surface would be indicated. Lines very close together indicate a sharp rise, while those further apart show a gradual slope. In Fig. 7 we see how a profile sketch can be made from the information contained on the contour map in Fig. 6.

MARATHON. On the little plain of Marathon, in Greece, about 25 miles northeast of Athens, may be seen a great mound nearly 50 feet high. Beneath it lie the remains of 192 gallant Athenians who gave their lives, 24 centuries ago (490 B.C.), to preserve

CUTTING THE MARBLE FROM ITS ANCIENT BED



Here is one of the New England quarries from which we obtain much of the marble for our buildings and statues. The stone is cut in great blocks, and steam engines and tackles then hoist it onto railway cars to be hauled away.

their city and all Greece from conquest by the Persian hordes of Darius the Great. The mound raised by their grateful fellow-citizens to receive their bodies and commemorate their heroism was excavated in 1890, and the sacred relics were brought to light for the first time since the day of their glorious victory. (For the story of the battle *see* Persian Wars.)

The famous "Marathon race" (covering 26 miles and 385 yards, the distance from Marathon to Athens) was instituted in the modern Olympic Games held at Athens in 1896. It was founded in honor of the runner Pheidippides, who brought news of the victory to Athens and died shouting, "Rejoice! We conquer!" The term has since been applied to other long distance races.

Marble. We owe most of our supply of the beautiful crystalline rock called marble to countless millions of tiny sea animals, whose mineral remains have been pressed together into this form. Limestone is formed the same way; indeed, marble is merely limestone which has been altered, or "metamorphosed," by the action of heat and pressure (*see* Geology; Limestone).

The color of marble depends on the purity of the limestone from which it is made. If considerable quantities of materials other than calcium carbonate or magnesium carbonate are present, the color varies according to the nature and distribution of these impurities in the rock. Pure marble is white, but impurities may make it red, brown, yellow, black, etc.; or, if the impurities are irregularly distributed, it may be mottled, or beautifully veined. Onyx marble (which must not be confused with true onyx, a variety of agate) is formed by the precipitation of calcium carbonate from solution, usually from the waters of springs; its colors are various, white, yellow, and green being common.

Marble has always been a favorite material with sculptors and architects because of its beauty and the ease with which it is worked. The exquisite statues of the Greeks were made from pure white "Parian marble" quarried on the island of Paros, in the Aegean. Today the marble most used by sculptors still comes from the famous quarries of Carrara, in northern Italy, which furnished the material for the Pantheon at Rome and have been worked steadily ever since.

The United States has large supplies of marble of many varieties. Vermont furnishes the greater part of the supply, but quarries also exist in Georgia, Alabama, Tennessee, Colorado, Arizona, California, Nevada, and Alaska. Marble is used for monuments, buildings, statues, bathroom and lavatory equipment, wainscotings, tops of tables, floor tiles, and for many other purposes. Since it resists fire better than granite, it is much used in fireproof buildings.




Hilda Hanway

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